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INFECTIONS DUE TO STAPH. AUREUS IN A GENERAL HOSPITAL

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Through an invitation extended to me to work in the United States, an opportunity was provided of studying the present clinical significance of lesions in which *Staphylococcus aureus* is found. The investigation was carried out in the New York Hospital, and the time of year chosen was the six months comprising the late autumn, winter, and early spring of 1956–7. It was hoped thereby to include a period of the year when septic conditions were considered to be most prevalent. The object of the study was to discover: (1) the incidence of staphylococcal infections, (2) their relation to antibiotic resistance, and (3) their clinical severity. To get a general picture, recourse was had to contemporary records of the whole of the hospital, exclusive of private patients, while more particular study was made of samples obtained from two-monthly studies on each of the floors devoted to an out-patient surgical clinic, to general surgery (including fractures and plastic work), and to general medicine. For purposes of reference *Staph. aureus* in the hospital records was defined as "a typical pigmented staphylococcal colony which shows haemolysis on a blood agar plate." One should emphasize that there were two sorts of investigation going on at the same time: (1) into the records of the hospital; and (2) from direct personal observations.

Incidence

To obtain the maximum incidence of infections in patients entering hospital, daily assessments were made throughout the six-months period of investigation of both the total number of patients entering and the number admitted specifically for the treatment of an infection. These, however, although exclusive of tuberculosis, were not necessarily staphylococcal; they might be diagnosed as any type of viral or bacterial infection—for example, infectious mononucleosis, infected pilonidal sinus, cellulitis, etc. At the end of the six months the figures thus computed amounted to a total of 11,670 admissions, with 446 (3.8%) patients admitted for treatment of an infection. There was little variation from month to month in the proportion of the total which were included in the infections. The figures are given in Table I, and show that the percentage of patients admitted for treatment of an infection was not high; it could be inferred that the proportion of these patients suffering from infections due to *Staph. aureus* was considerably lower than 3.8%.

From a study of the bacteriological records it was possible to obtain some idea of the number of infections due to *Staph. aureus* within the hospital. These also were studied daily, records being made of each patient's name, the type of lesion from which he was suffering, and the organism isolated from it. The totals were naturally higher than the totals admitted for treatment of an infection, for they included reports on subsidiary lesions—for example, a patient might be admitted for a neurological disorder and develop a boil on one of his limbs. Also, much the greatest number of records referred to nose and throat swabs, many of which were taken from children as a routine measure on admission, irrespective of whether the children had any condition suspected of being infected within the vicinity of the throat. Thus, of the 680 reports made of cultures from throat swabs of in-patients, only 260 were described in the records as associated with inflamed areas. Only these latter throat cultures were included in the number

TABLE I.—*Number and Percentage of Patients Admitted Within the Hospital Diagnosed as Suffering from an Infection*

	Total Patients Admitted	Total Patients Admitted for Treatment of Infection	Percentage of Total Admitted with Infection
November, 1956	2,020	73	3·5
December, 1956	1,810	77	4·2
January, 1957	2,224	80	3·6
February, 1957	1,906	67	3·5
March, 1957	2,240	77	3·4
April 1–21, 1957	1,470	72	4·9
Totals ..	11,670	446	3·8

TABLE II.—*Number and Proportion of Patients Admitted Who were Suspected of Infection while in Hospital and From Whose Lesions Staph. aureus was Isolated*

Month	(1) No. of In-Patients with Lesions Suspected of Infection	(2) No. of Patients Whose Lesions Contained *Staph. aureus*	(3) Percentage of (1) from which *Staph. aureus* was Grown	(4) Percentage of Total Patients* Admitted Whose Lesions Contained *Staph. aureus*
November, 1956	344	90	26·2	4·45
December, 1956	672	113	15·2	6·3
January, 1957	791	135	15·4	6·1
February, 1957	690	104	15·0	5·4
March, 1957 ..	646	110	15·3	4·9
April 1–21, 1957	511	70	17·6	4·7
Totals ..	3,654	622	17·0	5·3

* For total patients admitted see Table I.

*From the Department of Public Health and Preventive Medicine, Cornell University Medical College, with a grant from Messrs. Lederle Laboratories Division, American Cyanamid Co.

examined for *Staph. aureus*. The figures for in-patients assessed in this way showed that, of the total of 11,670 patients admitted, a *Staph. aureus* organism was isolated from 622 (approximately 5.3% of the total), a figure distinctly higher than that obtained from patients infected on admission. Table II gives the figures from which the percentages were derived.

In out-patient surgical clinics the proportion of lesions containing *Staph. aureus* was more than twice as high as that of the inmates of the hospital in general. From 1,551 patients suspected of being infected, *Staph. aureus* was isolated from 624—40% as compared with 17% for all infections within the hospital. It was not possible to gauge what proportion this was of all those admitted to the out-patient surgical clinics, for the method of recording admissions was too complicated for one worker to be able to use in the time available. It is, however, interesting to note that the percentage quoted varied from month to month, being at its highest in December, 1956 (48.7%), and decreasing to its lowest in March to April, 1957 (30.8%).

Special Studies of Incidence

These were necessarily carried out in sequence and cannot therefore be described as strictly comparable. Two months were devoted to each type of clinic, during which time the same investigator examined, among a series of consecutive admissions, every lesion in the clinic suspected of being infected, there being no selection of patients. The criteria of infection were: (1) the presence of redness, swelling, and tenderness of surrounding tissues; (2) the presence of pus or mucopus; or (3) the chronicity of an open wound, such as an ulcer, which had defeated all previous efforts to heal it. If any or all of these conditions were satisfied and it was possible to obtain a specimen, a sample was taken and investigated in a bacteriological unit specially devoted to the investigation. Thus every swab represented a lesion which was suspected of being infected. The results thus obtained were as follows:

Surgical Out-patient Clinic.—Between November 1 and December 30, 1956, 301 patients were seen and 113 were thought to have infections. Although 30 lesions were not examined bacteriologically, of the remaining 83 *Staph. aureus* was present in 70. Thus the incidence of lesions infected with this organism should have lain between 24 and 33% of admissions. A few of the abscesses when first opened were sterile on culture in spite of containing material grossly indistinguishable from pus. These patients had not received antibiotics and the sterility of their contents remains unexplained.

Surgical In-patient Clinic.—During January and February, 1957, 362 patients were admitted to the surgical floors. The number from whom swabs were taken because of suspected infection was 62, but in only 48 of these was *Staph. aureus* isolated—an incidence of 13.3%.

Medical In-patient Clinic.—From March 1 to April 20, 1957, 217 patients were admitted to the medical floors. Those in whom a lesion was suspected of being infected numbered 55; *Staph. aureus* was isolated from 37, the incidence during this time being, therefore, 17% of admissions.

For comparison, the figures obtained from the hospital records and from each type of clinic are given in Table III. From this it is seen that a much greater incidence of staphylococcal infections was obtained from direct observation than from the usual methods of examination.

TABLE III.—*Incidence of Lesions, Among Patients Admitted, From Which Staph. aureus was Isolated*

	Time	Total Admitted	No. with *Staph. aureus*	Percentage with *Staph. aureus* of Total Admitted
Whole hospital, in-patients	Nov. 1, 1956–April 20, 1957	11,670	622	5·3
Surgical out-patient clinic	Nov. 1–Dec. 30, 1956	301	70 (+30 or less)	24 to 33
,, in-patient ,,	Jan. 1–Feb. 28, 1957	362	48	13·3
Medical ,, ,,	Mar. 1–April 20, 1957	217	37	17

Relation of Staphylococci Found to Antibiotic Resistance

A short and easily applied method of estimating sensitivity was employed, so that a test was also made of the practicability of testing antibiotics before treatment. The staphylococci included were limited to those which were haemolytic, had the ability to ferment mannite, and exhibited coagulase activity against pooled human plasma. Observations were also made on pigment production, but very few among those tested did not produce a yellow colour. The antibiotics tested were those in common use—penicillin, streptomycin, chloramphenicol, oxytetracycline and tetracycline, erythromycin, novobiocin, and, at a later stage, bacitracin. Staphylococci were picked from a surface colony appearing on a blood-agar plate which had been inoculated directly with material from the lesion. The surface of a second blood-agar plate was heavily seeded from this single colony emulsified in saline. "Multidiscs"* were then placed directly on the agar surface. Additional multidiscs containing novobiocin, 5 μg. per ml., and bacitracin, 2 units per ml., were also used, but the poor diffusibility of the latter prevented its results from being assessed satisfactorily. The plates were incubated at 37° C.

Strains were considered sensitive when a ring of inhibition approximately 20 mm. in diameter was produced within 24 hours' incubation on a blood-agar plate. Occasionally a few minute colonies would appear, growing on the area of inhibition, but these were disregarded for practical purposes. The figures for each clinic are given in Table IV. It will be seen that out of 123 strains obtained from the 230 infected lesions found among 880 patients none was found to be resistant to all six antibiotics, and the antibiotics to which most strains were susceptible were those least often used in hospital. Tests for susceptibility to bacitracin were carried out on 60 strains. A well-defined but narrow ring of inhibition was produced with 39 of these.

TABLE IV.—*Numbers of Strains of Staph. aureus Found Sensitive to Antibiotics*

Clinic	Total Strains Tested	No. Sensitive To						
		Penicillin	Streptomycin	Chloramphenicol	Tetracyclines	Erythromycin	Novobiocin	None
Surgical out-patients	55	20	43	47	35	46	45	0
,, in-patients	48	8	20	47	16	40	47	0
Medical ,,	20	5	11	17	8	16	17	0
Totals ..	123	33	74	111	59	102	109	0

It is of interest to note that the pattern of resistance during the earliest three months of the study remained nearly uniform; the majority of strains were susceptible *in vitro* to chloramphenicol, erythromycin, and novobiocin, but resistant to penicillin, streptomycin, and the tetracyclines. During February, 1957, however, when erythromycin was used more frequently than before on the surgical in-patient floors, the number of strains found resistant to this antibiotic mounted. In fact, on four occasions when serial cultures were made, beginning before erythromycin treatment, the *Staph. aureus* isolated some days later was found to be resistant to this antibiotic. This finding is in agreement with that of Haight and Finland (1952). It is also of interest that every strain found sensitive to penicillin was also inhibited by every other antibiotic tested.

*Obtained from Consolidated Laboratories Inc. Each multidisc contained 10 μg. per ml., except that for penicillin, whose concentration was 1.5 units per ml.

From Table IV it can be seen that penicillin-sensitive strains were isolated in a greater proportion of the total obtained from surgical out-patients than from the in-patients on either the surgical or medical floors. The out-patients were a mixture of those coming direct from outside and those referred to the clinic after having received treatment within the hospital. It was hoped that, by analysing only those cultures made from freshly opened lesions, some light might be thrown on the incidence of penicillin-susceptible strains in patients who had not been treated in hospital. The results, however, indicated little, for not only was the number small (14) but the staphylococci isolated were evenly distributed between strains susceptible and those insusceptible to penicillin.

Clinical Significance of Staph. aureus in Lesions

From the bacteriological records of the hospital it could be found what type of lesion was most commonly associated with the bacterium in question and from which the staphylococcus was most commonly isolated in pure culture. A survey of cultures made from sputa, throat swabs, infected eyes, abscesses, infected bursal fluid, extremities, sinuses, stools, dermatitis, cellulitis, omphalitis, infected ulcers, wounds (operative and accidental), and from biliary drainage, ani, vaginae, and cervices, showed clearly that there were certain conditions in which *Staph. aureus* was most often found alone. Table V gives these types of lesions and the frequency with which *Staph. aureus* was isolated from them.

In contradistinction to the figures in Table V the number of times *Staph. aureus* was found alone in cultures from throat swabs or blood was very much lower. 1,418 throat swabs were cultured, and, though *Staph. aureus* was found in these 645 times, it grew in pure culture nine times only. Similarly, a low proportion of *Staph. aureus* was found among 396 blood cultures; from these staphylococci were isolated 20 times and from the living body 10 times only.

TABLE V.—*Infected Conditions in Which Staph. aureus Predominated*

Type of Lesion*	Total	No. with Pure Cultures of *Staph. aureus*	No. with Mixed Infections Including *Staph. aureus*	No. Infected But With *no Staph. aureus*	No. in Which No Growth was Obtained
Boils, abscesses, and carbuncles	228	144	23	41	20
Cellulitis	15	11	1	2	1
Infected extremities	88	44	27	16	1
Infected eyes (mainly anterior chambers)	84	31 + 13†	9 + 6†	9	16
Infected wounds	171	63	43	50	15

* The different categories are mutually exclusive.
† These figures denote the number of times *Staph. albus* was isolated.

Severity of Staph. aureus Infections

It was only possible to adjudge the seriousness of these infections from direct observation. For this purpose the special studies provided the best means of estimating how much damage was associated with *Staph. aureus*. In none was the organism isolated from the blood. Apart from this the studies bore out the findings of the bacteriological records in the type of lesion expected to be associated with *Staph. aureus*; most were superficial lesions such as boils, stitch abscesses, pulp infection, or paronychia. Often a post-operative sinus would appear as an outlet for material which looked brown and grumous, and might easily be ascribed to the breaking down of a haematoma. Staphylococci were almost always associated with these, but it was extremely difficult to assess their potentiality for harm. Wounds with such sinuses, for prophylactic reasons, were usually opened down to the underlying fascia for their entire length so as to enable easier egress of the infected fluid. Though the wound looked unpleasant, its healing was progressive and the patients suffered no systemic effect after its opening.

Other conditions in which *Staph. aureus* was found included dermatitis, pressure sores, chronic ulcers, compound fractures, otitis, infected glands, and cellulitis when it had reached a stage at which fluctuant areas could be incised. A number of such cases were seen which subsided under antibiotic therapy well before this stage; their bacteriology then had to remain in doubt. *Staph. aureus* accompanied by other organisms was also found in sputa of patients suffering from pneumonitis following bronchitis, carcinomatosis, or chronic conditions such as bronchiectasis. It was thus not possible to ascribe any part of the patient's illness to this organism alone. Conditions from which it was isolated in pure culture gave some idea of its pathogenicity. In pure culture it was undoubtedly associated with the presence of creamy pus, as, for instance, the purulent exudate from a chronic empyema sinus, abscess cavities, and exposed bone. The severity of these infections in terms of danger to life was not great, nor could necrotic tissue be excluded as the origin of the pus. There were, however, three very ill patients whose cases require more detailed description.

One patient, with rheumatoid arthritis, whose abscess developed about her hip-joint after injections of cortisone, had fever so long as the pus, containing penicillin-resistant staphylococci, was enclosed, but, once opened, the abscess cavity ceased to cause her disturbance except while it was being packed. She received no antibiotics during the period of observation owing to previous allergic reactions to them.

A second patient who entered hospital was operated on for removal of an iliac thrombosis. In spite of this, gangrene steadily ascended her limb till successive amputations ended in a disarticulation at the hip. *Staph. aureus* was repeatedly isolated from her gangrenous tissues, but there was no frank suppuration or evidence of inflammation. Her vascular condition seemed sufficient reason to account for her serious condition.

A third patient died. She entered hospital at the age of 80 for treatment of diverticulitis by resection of her gut in the ileo-caecal region. Owing to the persistence of symptoms, a further resection of the sigmoid was performed, and a gastrostomy. A subtotal gastrectomy was later undertaken owing to much bleeding from the gastro-intestinal canal and the presence of multiple ulcers on her stomach surface. Death eventually supervened, but, though a *Staph. aureus* had earlier been isolated from a rash round one of her wounds, there was no sign of peritonitis until necropsy, when perforation of her colon was also observed. *Proteus vulgaris* had been found in the abdominal wound connected with the gastrostomy, and after she had died it was isolated, together with *Staph. aureus*, from her peritoneal cavity, blood, and lungs. Thus, though *Staph. aureus* was present in the pathological foci, death could not with certainty be ascribed to it alone.

Discussion

In considering the findings reported here one should remember that this was primarily a clinical investigation. Barring those from whom routine nose and throat cultures were made, patients were first examined, and only after some type of infection had been diagnosed were specimens sent for bacteriological examination from any inflamed and accessible area. The ubiquitous presence of staphylococci (Blowers, Mason, Wallace, and Walton, 1955; Howe, 1954, 1956; Hare and Thomas, 1956; Shooter, Taylor, Ellis, and Ross, 1956; Shooter, Griffiths, Cook, and Williams, 1957) would not necessarily account for their appearance in these lesions. Inasmuch as the special studies bore out the findings obtained from the hospital records, it may be as well to mention that every care was taken not to contaminate the culture swab by contact with the patient's skin.

Thus it would seem fair to associate *Staph. aureus* with the types of infection described here, if not definitely to attribute them to its presence. The irritation caused by a tight suture, for instance, could readily cause a stitch abscess or some ulceration without any demonstrable presence of *Staph. aureus*. Was its presence therefore to be considered as causal when the two were found together? In the same way, when post-operative haematomata eventually found their way to the surface and began to exude

through a sinus, some doubt must be cast on the assumption that this could be attributed to the presence of *Staph. aureus*. Nevertheless, though little clinical evidence of serious pathogenicity could be seen in the staphylococci, susceptible or insusceptible to the antibiotics used in the patients' therapy, their presence in greater proportion among patients while in hospital than when entering (5.3% as compared with less than 3.8%) indicates that these same patients were not free from risk of superimposed infection. For example, a patient with a necrotic pulp infection with osteitis, whose culture when first examined revealed only a Gram-negative rod, was admitted for further surgery, and, in spite of the administration of erythromycin, four days later a *Staph. aureus* was cultivated from the wound.

It was not a function of the investigation to examine the opportunities for added infection which arose in this hospital, but it was observed that, so far as arrangements on the different floors were concerned, risk from infection by contact or through air currents was reduced to a minimum by having no more than four patients to a ward, the provision of washing facilities for dressers and others in each ward, and the covering of sterile instruments and towels, which were wrapped separately for each dressing. Nurses seldom touched the dressings, which were left to the interns, who had been instructed in a no-touch technique. Since the incidence of *Staph. aureus* in lesions found on the medical floors was higher, in the special study, than on the surgical in-patient floors, added infection could not be attributed reasonably to faulty dressing technique.

Apart from the presumptive evidence of added infection within the hospital, other points of interest arise from this survey. None of the staphylococci included in the special studies was persistently resistant to every antibiotic against which it was tested. It would seem, therefore, to be to the advantage of the patient, when culture of his lesion reveals a pure growth of staphylococcus, to test its susceptibility to antibiotics. Though not infallible, the tests have shown a fair correlation between sensitivity *in vitro* and clinical response (Rodger, Branch, Power, Starkey, Gregory, Murray, and Harrop, 1956). Such tests when carried out with multidiscs on blood agar can give an answer within eight hours to two days, according to whether the test is done on the primary or on a subculture. This does not seem a long time to wait. In the meantime the medical attendant prescribes an antibiotic till he learns from the result of the test that he is confirmed in his choice or that another is more suitable.

From the appearance of the staphylococcal infections in the special study it was difficult to believe that they were of serious import. When dealt with effectively by antibiotic therapy at their earliest sign or by surgery when pus had collected, the period of convalescence was mainly occupied in progressive healing. This applied to those incisions in which no other secondary infection took place.

No mention has been made here of neonatal staphylococcal infection, staphylococcal infection of lungs and bronchi, or of enterocolitis. The first may be a primary infection, the infant having as yet developed little immunity to bacterial invasion; thus it may succumb to an organism of relatively low virulence (Beaven and Burry, 1956; Wysham, Mulhern, Navarre, LaVeck, Kennan, and Giedt, 1957). In the reports obtained during the six months' survey at the New York Hospital there were none in which *Staph. aureus* was cultured in pure growth from either sputa or faeces. Yet severe infections of lungs and intestinal canal are attributed to the staphylococcus—for example, the pneumonias described by Hausmann and Karlish (1956) and the diarrhoeas by Cook, Elliott, Elliot-Smith, Frisby, and Gardner (1957), and by Turnbull (1957). In considering the origin of such serious conditions one should take into account that, when "other pathogens" are also present, or where little or slow response is made to administration of an antibiotic to which the staphylococcus isolated is sensitive, one's attribution of the disease in question to the staphylococcus can be called in question. In any event, as infections by *Staph. aureus* do not lend themselves to the fulfilment of all of Koch's postulates, every care should be taken to exclude any other factor in the pathogenesis of the lesion being studied.

From this point of view attention should be drawn to the fact that a high proportion of the patients specially studied had other debilitating conditions predisposing to infection, such as diabetic gangrene, carcinoma, acute pancreatitis, paraplegia, multiple injections of cortisone, arteriosclerosis, or other vascular conditions obliterating the blood supply to a part. If these were not present, their age, often 65 to 85 years, militated against the patients' resistance to bacterial invasion. These conclusions are in conformity with the opinions expressed by McDermott (1956a, 1956b).

Summary

Of 11,670 patients admitted to the New York Hospital during the six months between November 1, 1956, and April 20, 1957, 3.8% were admitted for treatment of some kind of infection, the inference being that those whose infections were staphylococcal comprised a still smaller proportion of the total admitted.

During their stay in hospital, 5.3% of these patients suffered from an infection from which *Staph. aureus* was isolated. From comparison of these percentages it is assumed that many of these infections were acquired in hospital. The incidence of staphylococcal infections within the hospital remained fairly uniform from month to month, but among surgical out-patients it was at its height in December, 1956, and January, 1957.

A special study carried out in consecutive patients over three periods, each of two months, on the surgical out-patient, surgical in-patient, and medical in-patient floors supported these conclusions and showed that none of the staphylococcal strains isolated from 123 patients were persistently resistant to each of seven antibiotics against which they were tested.

When *Staph. aureus* was the only organism cultured from infected lesions and the patient did not suffer from some condition predisposing to infection, there was little evidence that, effectively treated, these conditions had serious consequences.

I am much indebted to Dr. Walsh McDermott for providing me with facilities for working in his department and for his advice; to Dr. David E. Rogers for supervising the bacteriological work concerned with the special study and for help in arranging the survey; to Dr. Frank Glenn for enlisting the co-operation of the surgical services in the investigation; to Dr. P. H. Peter Dineen for his willing and invaluable help in the same service; to Miss M. Leask for making all the records of the bacteriological department of the New York Hospital available to me; to Miss Campbell for giving me access to the admission of in-patient records; and to Miss Helen B. Lincoln for help from the case records department. To the interns and members of the nursing and clerical staffs I owe much for their helpful co-operation.

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STUDIES OF THEATRE VENTILATION AND SURGICAL WOUND INFECTION

BY

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The purpose of this report is to describe the measures taken to reduce the risk of air-borne infection of aseptic surgical wounds in patients treated by the Surgical Professorial Unit at St. Thomas's Hospital during the years 1955, 1956, and 1957. Particular attention was paid to the possibility of reducing the bacterial content of the theatre air, and hence the risk of wound infection, by altering the method of ventilating the theatre. The system existing at the beginning was a plenum or positive-pressure one. This principle was retained, but in addition it was arranged that the pure air introduced into the theatre should form a current directed on to the operating table.

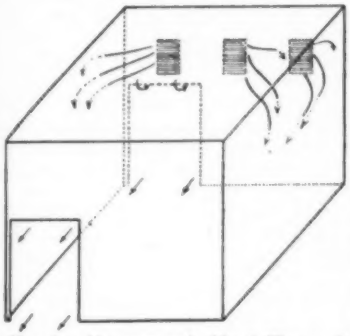

FIG. 1.—Air currents in North Theatre 2 in 1955 before altering ventilation.

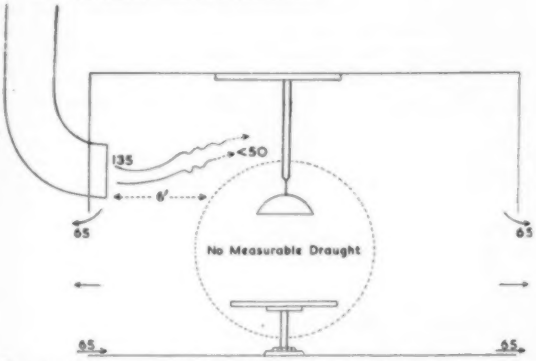

FIG. 2.—Air currents in North Theatre 2 in 1955 before altering ventilation. The doorway on the right leads to the sterilizing-room. The entry doorway is shown on the left: the inward draught at floor level is referred to in the text. Numbers refer to velocities in feet per minute except 6', which indicates a distance of six feet.

System of Ventilation in Theatres and How it was Altered

About half of the operations performed by this surgical unit were done in the North Theatres of St. Thomas's Hospital, and it is this series of 982 "clean" operations that has been studied. The North Theatres are built on the twin system. A plenum system of ventilation had been installed, and was in existence before the present investigation started. Filtered air from the roof was introduced into each theatre through three input vents placed high up on one of the walls. There were no exhaust fans in the theatre itself, so that a positive pressure of air existed in the theatre. The air emptied through two doorways—the entry doorway and the doorway into the sterilizing-room, in which there was a small exhaust fan designed to remove steam. At the outset of this study neither of the two doorways was equipped with a door.

The directions of air currents in the theatre were studied by the use of titanium chloride smoke and their velocities with a rotary multi-vane anemometer.† Their state at the outset of the investigation is shown in Figs. 1 and 2. The air from the three inputs passed more or less horizontally across the theatre at a high level. It was deflected away from the centre of the theatre towards the side walls in the manner shown in Fig. 1. It will be seen that, either by design or by accident, an area of relatively still air existed in the region of the operating table.

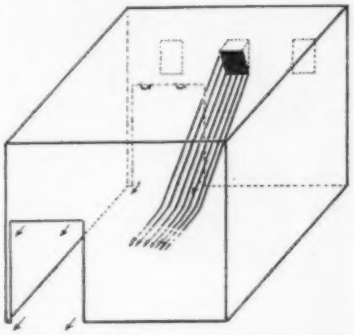

FIG. 3.—Air currents in North Theatre 2 after altering ventilation at end of 1955.

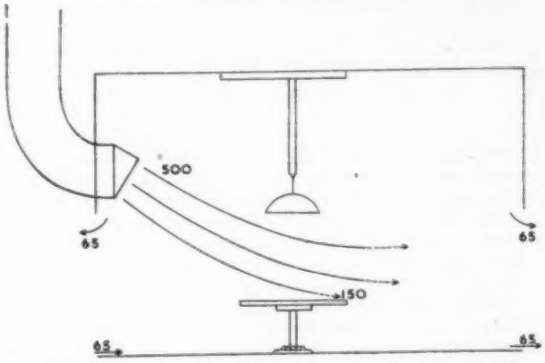

FIG. 4.—Air currents in North Theatre 2 after altering ventilation at end of 1955. Numbers refer to velocities in feet per minute.

After the initial period of study the ventilation was altered to produce a current of air passing as directly as possible from input to operating table (Figs. 3 and 4). The two side inputs were closed so that a greater flow of air could be obtained from the central one, to which a Crittall "deflecto" grille (8 by 12 in. (20 by 30 cm.) in size) was fitted (Fig. 5). This had louvres which could be adjusted to alter the direction of air-flow upwards or downwards or from side to side. The distance from the grille to the centre of the table was usually 10 to 11 feet (3 to 3.35 m.), the width of the air-stream over the table being about 4 feet (1.2 m.). The velocity of air at the mouth of the grille was 600 to 700 feet (183–213 m.) per minute at its best. The velocities over the table were usually 150 to 250 feet (46–76 m.) per minute. It was found that the velocity was much affected by alterations in the resistance of the filters through collection of dirt or variations in resistance when they were renewed. Frequent checks of the air velocity over the table were therefore necessary.

*Now holding B.M.A. Scholarship.
†Made by Short & Mason Ltd., Hale End Road, London E.17.

The twin theatres are designated theatres 1 and 2. The ventilation was altered only in theatre 2, and it was planned to use data from the unaltered theatre 1 so far as possible for comparison. The change in the ventilation in theatre 2 did not produce any detectable change in the air currents in theatre 1.

Bacterial Content of the Theatre Air

A slit sampler* (Bourdillon *et al.*, 1948) was used to estimate the bacterial content of the theatre air. The average counts, expressed as colonies per cubic foot from some different sources, were as follows: (1) outside atmosphere, 3; (2) ventilator air, 1; (3) air from surgical ward, 33; (4) air leaving theatre through doorway to sterilizing-room, 46; (5) air inflow current in entry doorway to theatre (at floor level), 106.

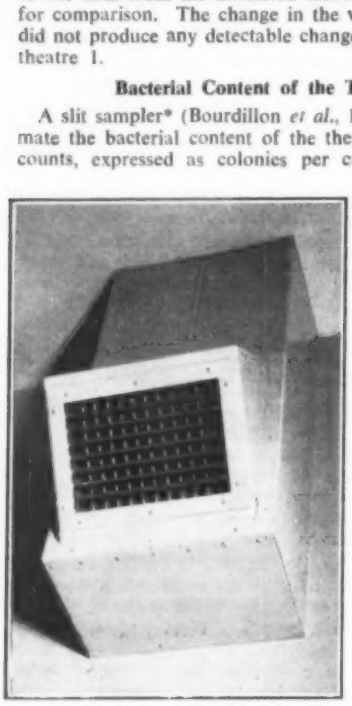

FIG. 5.—The input grill with adjustable louvres

Samples during operation were taken through a sterile rubber tube, one end of which was attached to the patient beside the incision and the other to the sampler. The samples, each of 2 cubic feet (0.028 cubic metre) of air, were taken at intervals throughout the operation. The first sample was taken as soon as possible after the patient had been covered with towels and just before the incision was made. Further samples were taken at intervals of 10 to 15 minutes throughout the operation. This usually meant that some eight or nine samples were taken during each operation, but during longer operations more samples were obtained. Records were kept of events and activities which might affect the bacterial content of the air in the theatre during the course of the operation.

The first series of counts was made during eight operations performed on different days in the period of time from February to December, 1955. During this time every effort was made to keep conditions unchanged. At the beginning of 1956 the ventilation was changed to project filtered air direct to the operation site in the way already described. No other alterations were made in the theatre technique. Counts were made during a further six operations on different days. The results are shown in Fig. 6. The average of the counts before the change in the ventilation was 21.7 (standard error ±1.2); after the change it fell to 9.9 (standard error ±0.6).

The change in the method of ventilation had been followed by a fall in the bacterial content of the theatre air to levels in line with those considered desirable by Bourdillon and Colebrook (1946), who advised an upper safe limit of 10 colonies per cubic foot (0.028 cubic metre) for quiet periods during major operations.

Analysis of the bacterial content of the theatre air during individual operations confirmed the findings of other workers (Bourdillon and Colebrook, 1946; Blowers, 1957) that the counts were high during activity in the theatre, when people were moving about putting the patient on the operating table or making similar preparations. It fell during the operation, when there was less movement in the theatre, and rose again after the end of the operation.

The rate of fall was rapid. In a typical example the count over the operation site in one patient was 52 colonies per cubic foot just after he had been placed upon the table, but was found to have fallen to 12 six minutes later and to 8 after another six minutes. The rise in bacterial content was equally rapid when activity was renewed in the theatre at the end of the operation. In this same case the count was 11 as the last stitch was inserted, but it rose to 75 three minutes later as the patient was moved from the table. It is related of Lord Lister that it was his practice, when all was ready for an operation, to stand in meditation for a few minutes before he began. There appear to be good bacteriological as well as spiritual grounds for doing so.

Another observation of interest was made when the anaesthetist who normally sat beside the patient's head stood up in front of the table in the air upwind of the operation site. The bacterial count near the wound was found to have risen from the general level pertaining throughout operation of less than 10 colonies per cubic foot up to 35.

Other Changes to Reduce Bacterial Content of Operating Theatre Air

After the effects of changing the direction of the air current had been studied two further changes were made (Table I). The first of these was to introduce the practice by the entire surgical team of changing into clean operating-suits. Before this only the surgeon and his first assistant had changed, the others merely donning a sterile gown over their ordinary clothes. Studies by Hare and Thomas (1956) had suggested that fewer bacteria might be liberated by people when they moved if they were wearing sterile or clean suits instead of their ordinary clothing under a sterile gown.

TABLE I.—*Averages of Air Counts During Operations (Total Colonies Per Cubic Foot) (All Samples Taken from Vicinity of Wound)*

1.	Before ventilation changed	21·7
2.	After	9·9
3.	After introducing use of sterile suits ..	7·8
4.	After adding new door	7·3

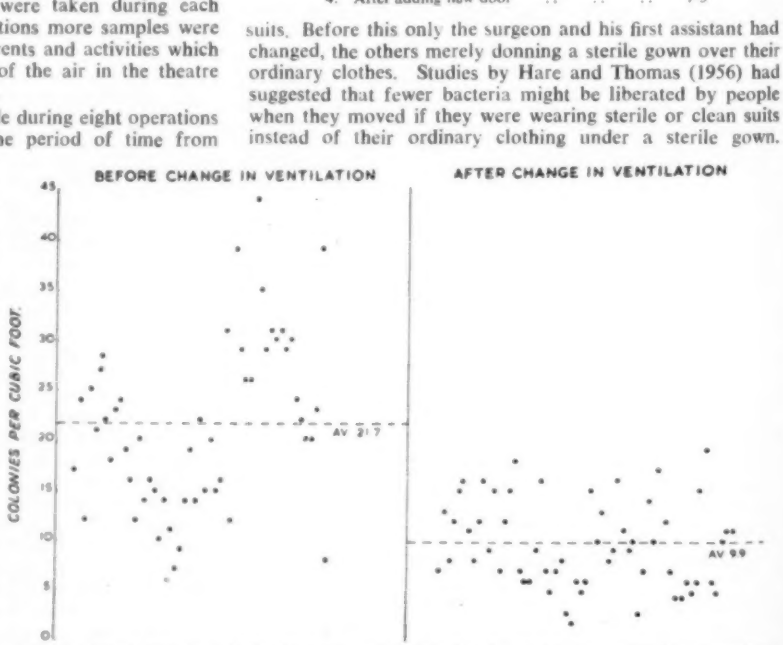

FIG. 6.—Total colonies obtained by slit sam pling the air of the theatre during operations before and after altering ventilation at end of 1955

*Manufactured by C. F. Casella & Co., Ltd., Fitzroy Square, London, W.1.

After this change of practice in 1956 another series of counts was made of bacteria over the operation site during 14 operations. The mean of the counts amounted to 7.8 compared with 9.9 before the change of practice.

The second alteration in the conditions in the operating theatre was made in 1957, when a door was hung in the entry doorway to the theatre. Before this there had always been, despite plenum system of ventilation, a current of air flowing into the theatre at floor level through the doorway. The use of a door changed the direction of this draught to an outward one. A series of samples taken over the operation site during 16 operations in 1957 following this change showed a mean of 7.3 colonies per cubic foot.

Both of these changes in bacterial content, although small and perhaps of doubtful statistical significance, were in the direction desired.*

Records of Wound Sepsis

A record was kept in a " wound book " of the particulars of all surgical operations on the surgical unit from 1955 onwards and the way in which the wounds healed. Cases in which infection existed before operation were excluded.

We were particularly interested in studying exogenous infections in clean surgical wounds. We therefore excluded from the sepsis figures cases of endogenous infection—for example, cases where the bowel was opened during operation and infection with coliform organisms ensued. The sepsis figures were found in the event to consist almost entirely of staphylococcal infections.

Sepsis was divided into two grades. It was classed as grade 1, or minor sepsis, if merely low-grade inflammation in the surface of the wound or the skin around it existed or if stitch infection occurred. Grade 2, or major sepsis, comprised those cases in which definite suppuration, delay in wound healing, and fever occurred. Swabs were taken from all infected wounds and records kept of the organisms grown and of their sensitivity to antibiotics.

Several things suggested that many of the cases of grade 2 sepsis were due to infection acquired during operation. Frequently the sepsis manifested itself first by pyrexia and perhaps deep pain or induration below the wound, during which time the surface of the wound appeared to be healing normally and showed no signs of inflammation. Later the inflammatory process reached the surface and pus was evacuated. It seemed likely that inflammation which arose deeply in this way was more probably caused by an infection introduced into the wound during the operation rather than to infection working its way down from the surface afterwards. On the other hand, many of the minor or grade 1 inflammations may have been post-operative ones. Support for this was suggested by the finding in a number of cases that swabs taken from the wound at the end of the operation were sterile but that later superficial grade 1 sepsis with positive swabs of the hospital staphylococcus developed.

Relation of Sepsis Rate to Bacterial Content of Theatre Air

The sepsis rates for clean surgical cases for the years 1955, 1956, and 1957 are shown in Table II. It is evident at once that the reduction in the bacterial content of the theatre air effected by the changed method of ventilation introduced at the beginning of 1956 and already described was not followed by a comparable fall in the sepsis rate for patients operated upon in theatre 2 where the change was made. This was so both for major (grade 2) sepsis rate and for the overall rate.

TABLE II.—*Sepsis Rates in* 681 *" Clean " Operations in Theatre* 2 *During* 1955–7 *(Ventilation System was Changed at the End of* 1955)

	1955	1956	1957
All sepsis	9·2% (22/237)	9·7% (29/297)	10·8% (16/147)
Grade 1 sepsis ..	6·3%	5·7%	7·4%
,, 2 ,, ..	2·9%	4%	3·4%

The figures for theatre 1, the twin theatre with unchanged ventilation, have not been included in Table II because less than half as many operations (301) were done in it and when broken down into subgroups the numbers were too small to be significant. The total sepsis rates for both theatres are, however, shown in Fig. 7.

Analysis of the monthly sepsis rate in Fig. 7 shows it to be unaffected by the change in ventilation in theatre 2 in 1956. Nor did the introduction in 1956 of the use by the entire surgical team of clean operating-suits for each operation list, or of the addition of a door to the theatre in 1957, affect the sepsis rate despite the downward trends in the bacterial content of the air. It appears that there is a rough correspondence between the sepsis rates in the two theatres, suggesting that they might have been influenced by some factors common to both.

The rate of grade 2 (major) sepsis might be considered to be more truly representative of infection acquired during operation than the total sepsis rate. However, analysis of this on a month-by-month basis showed that it followed in general the total sepsis rate and did not appear to be influenced by the measures taken to reduce the risk of airborne infection in the theatre.

A feature of Fig. 7 which may be of significance is the very similar rise in the sepsis rates which occurred in June, 1956, when the plenum ventilation system of both theatres went out of action. This resulted in the failure of the positive-pressure ventilation in both theatres and may have allowed the ingress of bacteria containing air from elsewhere in the hospital.

Relation of Sepsis Rate to Presence of Staph. aureus in Air of Theatre

In the preceding experiments only total colonies were considered when counting the plates exposed in the slit sampler. All the plates used contained phenolphthalein diphosphate

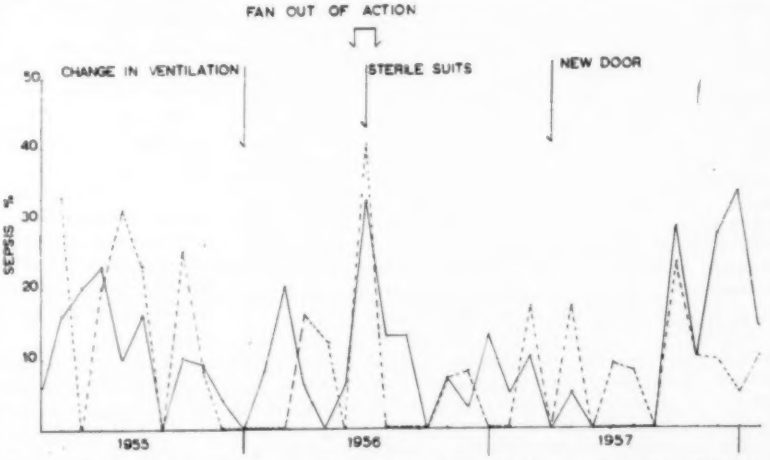

FIG. 7.—Total sepsis rates in the two theatres on a monthly basis. Ventilation altered in Theatre 2. The numbers developing sepsis expressed as percentage of the " clean " operations at risk. ----, Theatre 1. ——, Theatre 2.

*The bacterial counts were also statistically analysed in another way. For each operation a bacterial count was done a number of times. The average of these was the average for the operation. To assess the count over a series of operations the average of the averages was taken. In this way the statistics for the four groups shown in Table I worked out as 22.0, 10.1, 8.1, and 8.2.

(Barber and Kuper, 1951), which enabled *Staphylococcus aureus* to be readily detected. It is of interest that this organism was recovered from the air of the theatre during clean operations in 1955–7 on only six occasions out of the 42 "clean" operations which were studied and that none of the patients involved developed sepsis.

On the other hand, staphylococcal infection did occur in patients during whose operations frequent air samples were taken and no staphylococci were detected. This certainly occurred with two out of the remaining 36 patients studied in 1955–7.

Thus there seems to be little relationship between the development of post-operative sepsis and the presence or absence of *Staph. aureus* in the theatre air. There are two possible explanations for this: first, that the sampling has in some way been unrepresentative of the risk of air-borne infection (particularly when it is remembered that all the air in the theatre is changed some 10 to 12 times an hour); or, secondly, that infection when it did occur was not air-borne but arose by some other means.

Possible Sources of Staph. aureus Other than Air of Theatre

There are many possible sources of infection of clean surgical wounds other than air-borne infection in the operating theatre, and some of them are discussed further below.

One source for which we discovered some evidence in our study was the patient himself. It is possible for the patient to become a carrier of the hospital staphylococcus during his stay in the hospital ward before operation and to bring the organism with him to the theatre. Swabs were taken from 50 "clean" surgical patients at operation: 30% were found to be nasal carriers and 10% skin carriers of the hospital staphylococcus.

An unfortunate example of the possible danger of such carriage was provided by a male patient who showed strongly positive cultures from his nose and bedclothes of a hospital staphylococcus resistant to antibiotics other than chloramphenicol and erythromycin. He developed a superficial infection with this organism in his femoral arteriogram wound. It cleared, and an arterial homograft was inserted three weeks later. This second wound healed *per primam*, but a false aneurysm developed three weeks afterwards at the arterial anastomosis, and from it the organism was grown. It was also isolated by blood culture. Ablation of the graft and amputation were necessary.

Discussion

Analysis of data from this investigation has shown that a substantial fall occurred in the bacterial content of the theatre air after altering the ventilation in it. The physical basis of this requires explanation. It is unlikely that a continuous emanation of contaminants from sources near the table would be effectively eliminated by a draught such as this because of mixing. Indeed, some experiments which were kindly performed for us by Dr. D. M. Lidwell showed that vapour emitted continuously by sources alongside the table was not prevented by the draught from reaching a detector placed upon it. Under natural conditions it is likely that much contamination of the air is of an intermittent nature due to the movements of people near the operating table. Bacteria or bacteria-carrying particles emitted in an intermittent fashion might be carried away before they had time to settle upon the wound or its surroundings.

No decline occurred in the incidence of post-operative wound sepsis amongst the patients operated upon in the theatre comparable to the fall in the bacterial content of the air. It is interesting to compare these results with those of Shooter *et al.* (1956), who in reducing the bacterial content of the air in their theatre achieved a marked reduction in the incidence of post-operative wound infection. They concluded that the infections in their series were chiefly due to contaminated air being sucked into the theatre from the surgical wards and that the reduction in the incidence was due to the inception of positive-pressure ventilation and possibly also to a cross-draught of fresh filtered air which they directed across the operating table. It may be that the introduction of positive pressure was more important than the cross-draught in their series, because in ours positive pressure was in operation from the beginning and no fall in sepsis followed the use of a somewhat similar cross-draught.

There are two possible explanations for the failure to reduce the sepsis rate in our patients. The first is that the reduction in bacterial content of the air, although marked, was insufficient for the purpose. This seems unlikely, because the reduction from 20 to under 10 colonies per cubic foot was about the same in Shooter's series as in ours, but it was sufficient to reduce the sepsis in his series. A second possible explanation is that the method of contamination of the wounds in our series was not air-borne, but by some other means.

There are many possible ways in which this might occur, many of them well-recognized hazards. Glove punctures constitute one (Devenish and Miles, 1939). McDonald and Timbury (1957) have shown that a suppurating area on the arm of the surgeon may provide the organisms. A somewhat similar occurrence was reported by Colebrook and Ross (1947). These are, of course, well-recognized hazards, against which strict precautions were taken. The second is an obvious and highly preventable one, and is unlikely to have occurred during this study, as it was particularly guarded against. Another which has already been mentioned, and for which some evidence was found in our studies, is the presence of hospital staphylococci on the skin of many patients when they reach the theatre. Still another hazard is contamination of the wound, or of suture or similar materials, by some member of the surgical team who has become a carrier of a particularly virulent type of staphylococcus. Examples of such happenings have been described by Penikett *et al.* (1958) and by Sompolinsky *et al.* (1957).

At the present time there appear to be no certain or simple means of distinguishing the particularly dangerous staphylococci from those found in routine swabbing in a high proportion of hospital personnel and patients until they make their presence known by causing sepsis. Until some simple test for distinguishing them is evolved, defence against wound infection must lie in a general effort to reduce cross-infection in both theatre and wards.

Conclusions

The bacterial content of the air of an operating theatre declined following the introduction of a cross-draught of fresh filtered air over the operating table.

This reduction in bacterial content occurred in a theatre in which a plenum positive-pressure ventilation system was already in operation.

No corresponding reduction occurred in the rate of post-operative wound sepsis in patients operated upon in this theatre.

The presence of wound infections can be attributed to several possible causes. One which was considered to be important in this study was the acquisition of hospital staphylococci by patients in the wards before operation. Many patients were found at operation to be carriers of the organism in the nose, on the bedclothes, or on the skin.

Reduction of the bacterial content of the air in operating theatres is desirable as a general principle, but is unlikely by itself to eliminate infection.

There is a need for a simple and practical test to detect the more dangerous carriers of organisms in hospitals.

We are indebted to Dr. J. L. Pinniger and the staff of the Jenner Laboratory, St. Thomas's Hospital, for much of the wound bacteriology; to Dr. R. A. Shooter for advice; to Mr. M. P. Curwen for considerable help with statistical problems; to Mr. T. W. Brandon for photography; and to Miss N. Lowater for technical assistance.

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ATTEMPTED SUICIDES ARRIVING AT A GENERAL HOSPITAL

BY

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Patients who have tried, with varying degrees of determination, to take their own lives present special medical and administrative problems in a general hospital. Their admission may be regarded with disfavour, treatment may be narrowly confined to their physical condition, provision for aftercare or psychiatric investigation haphazard or ignored. They may even be notified to the police, and taken from hospital to court, where a prison sentence may follow. If the hospital has a psychiatric department, the reception and disposal of these patients is more likely to be conducted in accordance with the needs of their mental state.

Over the past 20 years, and markedly since the war, there has been a continued rise in the incidence of suicidal behaviour—deaths by suicide in England and Wales in 1956 were 5,262, the highest ever recorded (Registrar-General, 1956) and there were *known* attempted suicides 5,387 (*Criminal Statistics*, 1956), thus bringing to the doors of the general hospital an increasing number of patients requiring resuscitation and rehabilitation. Some of these patients came to Guy's in 1957. What they were like, and how they were dealt with, is the subject of the present inquiry.

Other Studies

The literature on suicide and attempted suicide is extensive, contributed mainly by psychiatrists and sociologists. A number of investigations on clinical series have been undertaken: of these, the most recent and most relevant for comparative purposes are those of Batchelor and Napier (1953, 1954), Batchelor (1954a, 1954b), Schmidt, O'Neal, and Robins (1954), Ettlinger and Flordh (1955), Robins, Schmidt, and O'Neal (1957), and Stengel and Cook (1958). Ecological factors affecting suicide rates in different London boroughs are examined by Sainsbury (1955). Epps (1957) analyses the social and psychiatric status of a series of 100 women committed to prison following a suicidal attempt. The preventive effect of hospital admission is discussed by Parnell and Skottowe (1957) in a study of 100 consecutive suicides.

By virtue of their setting—that is, in institutions or public general hospitals—the clinical studies have largely been limited to patients from lower-income groups. Stengel and Cook (1958) have pointed out the lack of information on the incidence and motivation of attempted suicide among better-off patients, whose action may never come to public notice. The present inquiry, covering both N.H.S. and private patients admitted to the York Clinic of Guy's Hospital, throws some light on social class differences.

Material Available

During the 12-months period January 1 to December 31, 1957, 44 attempted suicides arrived at Guy's, 34 coming to the casualty department and 10 being admitted direct to the York Clinic. Ten of the casualty arrivals were transferred elsewhere; 24 were admitted to the general wards. As the York Clinic group was so small, the previous year's direct admissions (11) were also included, giving an overall total of 55. Full psychiatric histories had been taken on all York Clinic patients: information available on ward patients was much less detailed and occasionally incomplete. No interviews were undertaken with any patient, nor were they followed up after discharge, but information was available for the 1956 York Clinic patients through the clinic's follow-up scheme.

Transfers from Casualty Department (Group 1)

This group comprised 10 patients (7 women and 3 men) who were sent elsewhere after emergency treatment, their transfer being arranged by the psychiatric out-patient department in co-operation with a duly authorized officer. Most were seen by the duty psychiatric registrar. Seven went to observation wards, three to mental hospital as voluntary patients. The patients had mostly been brought in by ambulance from the neighbouring district, either living locally or having been picked up in the street. Two had no fixed address; three came from other Central London areas. Involvement of the police was recorded in only one case. Six arrived before midday, three in the afternoon, and one at 7 p.m. Eight were conscious on arrival, one semi-conscious, one not recorded. Four required no special treatment, three had stomach wash-out, two sutures, and one an emetic. The method of the suicidal attempt was barbiturate overdose (4), slashing (2), coal gas, hanging, jumping, and other poison (1 each). Ages ranged from 19 to 66, six being between 20 and 49 years. Three were married, three single, one was separated, and three were not recorded. Occupation, where recorded, was mainly unskilled. One patient was a vagrant, two were unemployed, and one was a foreigner (Polish).

The precipitating stress of the suicidal attempt, so far as could be judged from the scanty information available, was depression (2 cases), marital trouble (2), unemployment, desertion by girl friend, physical illness, alcohol (1 each), not known (2). Six patients had a history of previous psychiatric illness; of these, four had two or more mental hospital admissions. Three were known to have made previous suicidal attempts (one more than once). Other psychiatric abnormality included two known epileptics (one with borderline mental deficiency), a leucotomized schizophrenic, and a drug-taker. There was evidence of hysterical traits (two patients had made frequent suicidal *threats*) and general instability. Only one patient, a man of 66, appeared to have had a good previous personality. (Unemployed man living alone, in poor health, suffering pain and sleepless for weeks, put his head in the gas oven.)

It was obvious that this was a sick and socially submerged group.

Admissions to the General Wards (Group 2)

Twenty-four patients (14 women and 10 men) were admitted from the casualty department during the year (one woman was admitted twice). Sixteen lived in the neighbourhood (S.E.1), four in other S.E. London districts, and two in S.W. districts. One, from Yorkshire, was found unconscious in a local public lavatory. The source of referral to hospital was the patients' G.P. (9 cases), the police (9 cases), uncertain or not stated (6). Seven patients were brought in before midday, three in the afternoon, and 14

from 6 p.m. onwards. Thirteen were in coma on arrival, four semiconscious, and seven conscious. Emergency treatment given before removal to the wards was as follows: stomach wash-out 11, bemegride 9, nikethamide 5, amiphenazole 3, reduction of fractures 2, sutures 1, other 3; observation without specific treatment 4; wash-out combined with analeptics 6. The method of the suicidal attempt was barbiturate overdose (17), aspirin poisoning (3), coal gas (2), falling (2), slashing (1), drinking lysol (1). One male patient combined three methods; the two admissions of one woman each followed an "unintentional overdose."

Fuller notes were available on these patients than on those in group 1, and their social background could be more adequately analysed. Marital status showed a preponderance of widowed (6). Ten were married, six single, and one was separated. Ages ranged from 23 to 76, 10 being between 20 and 39, but 12 (50%) were 50 and over (a finding similar to that of the Dulwich Hospital series, where 23.6% were 60 and over). The social-class distribution, as also at Dulwich, showed an over-representation of the unskilled: 16 (66%) came from Social Classes IV and V; 5 from Social Class III, 1 each from I and II.* Occupations recorded were labouring and unskilled (13), clerical (3), professional (1), pensioners, the disabled (3), "housewives" (2). Six patients, all men, were unemployed at the time of the attempt. The police were noted as being involved in 11 cases.

Precipitating Stress.—Social factors appeared to predominate: they frequently overlapped, or were found together with depressive states. Isolation was a common feature: loneliness, living alone, life in lodgings, homelessness, occurred in 10 cases. Alcohol (getting drunk, rather than chronic alcoholism) was a precipitant in seven, followed by marital trouble and rows with violence (5), debts and money worries (4), unemployment (4), housing conditions (4), illness or death of family member (3), trouble with neighbours (2), trouble with parents (1). In the category of mental and nervous disorder there were 11 mentions of depression, two each of paranoid ideas and insomnia, and one of "nerves." Physical illness was cited in four cases (three were sufferers from chronic conditions).

Previous Psychiatric Illness.—Six patients had been in mental hospitals, two of them twice and one three times. Five had been treated, or were currently under treatment, at psychiatric out-patient clinics. One had been admitted to an observation ward. Psychiatric history was not recorded in nine. Previous suicidal attempts were known to have been made by five patients, two of them twice, and suicidal threats by two. Psychiatric diagnoses had been made in 16 cases; of these, at least five were depression, then came hysteria (3), epilepsy (2), mental deficiency (2), and one each of alcoholism, addiction, chorea, and dementia and psychopathy. Had these patients been subjected to complete psychiatric investigation, it is probable that the incidence of abnormality would have been found even higher: as it was, almost two-thirds had a known previous history of mental disorder. Again, as in group 1, it is clear that these patients who attempted suicide because of the misery and unhappiness of their lives have in almost all cases the additional handicap of instability and often were of below-average intelligence. In only two instances, and in both when under the influence of alcohol, did the attempt appear to have been made by a previously stable individual. (A married man aged 52 with his own small business was upset by the sudden tragic death of his eldest son (married, one child) two days previously. He went out drinking, and took an overdose of tablets given by the G.P. to help him sleep.)

Length of Stay.—Many of these suicidal attempts had not seriously endangered the patient's life or rendered him in need of prolonged in-patient medical care. The average length of stay was accordingly short: 11 days (average length of stay, Guy's general medical wards, 1957, 26 days; overall average, 1957, 15.63 days). At one extreme two patients were discharged after 24 hours; 14 stayed seven days or less; the longest stayed 40 days (surgical case with multiple fractures). Three of these patients were transferred to the psychiatric unit (York Clinic), where they remained a further 4, 20, and 69 days respectively. Another patient, from a surgical ward, was transferred to New Cross Hospital for a further 57 days.

Disposal.—The 24 attempted suicide admissions were distributed among one surgical and six medical wards, under the care of two surgeons and five physicians. It was by no means the rule that a psychiatric opinion was sought on these patients, nor could it be determined from the medical notes why apparently similar cases received different treatment in this respect. Of the 24, 12 were seen by a psychiatrist or psychiatric registrar, 4 were referred to the almoners, and 8 were discharged without further arrangements for social or psychiatric help being made. The final disposal of all patients was as follows: home in care of relatives (4), to mental hospital as voluntary patient (3), to observation ward (2), to hostel or home (2), convalescent home and other hospital (1 each); 8 were referred to psychiatric out-patient departments (5 to Guy's, 3 elsewhere); and 3 were transferred to the York Clinic for in-patient treatment.

York Clinic Direct Admissions (Group 3)

Ten attempted suicides were admitted during 1957 and 11 in 1956. As they do not differ in any essential respects they have been grouped together to give a number comparable to that of the general ward admissions. Of the 21 patients (17 women and 4 men†), 13 were married, 5 single, 1 each widowed, divorced, and separated. Ages ranged from 20 to 60, the majority (13) falling between 30 and 49. Only four were over 50, in contrast to 12 in group 2 (ward admissions). Sixteen were private patients and five free Health Service patients. Sixteen were drawn from Social Classes I and II (9 and 7 respectively), four from Social Class III, none from IV, and one (an emergency admission from the psychiatric out-patient department) from Social Class V. Occupations were professional and managerial 10, business proprietors 4, clerical workers 4, and Civil Service, domestic, and nil 1 each.

These patients' homes were distributed over a much wider area than either of the other two groups: seven lived in S.E. and S.W. London districts, six in W. and N.W. districts, three were from rural Surrey, two from the provinces, one from Eire, and two were flown direct from overseas (Basrah, Trinidad). Eleven had been transferred from a general hospital, seven were sent in by their G.P., one by an outside psychiatrist, and two from Guy's psychiatric out-patient department. Only two cases were known to the police (one in Social Class II, one in III).

Most had received emergency treatment at home or in hospital immediately after the suicidal attempt, and only four were in coma on arrival at the clinic. The preferred method of the attempt was barbiturate poisoning (14 cases). An overdose of chlorpromazine hydrochloride was taken by two patients, of aspirin by one, and of insulin by one. Slashing, stabbing, strangulation, and jumping each occurred once. Two patients, determined, combined more than one method; in other cases the injury or overdose appeared more of a gesture than a serious attempt.

Precipitating Stress.—In comparison with groups 1 and 2, psychiatric rather than social factors were predominant. This group of upper-class and for the most part economically secure patients were not exposed to the stresses attendant upon poverty, unemployment, and lack of a settled home. On the other hand, they had been selected to some extent by a previous contact with the clinic or by an obvious psychotic illness requiring psychiatric care. Depression or depressive relapse was present in 15 cases, paranoid ideas or paranoid psychosis in 3 (2 of them concerned with a spouse's infidelity), "nerves," insomnia, other neurotic symptoms (3). Worry over physical illness, real or fancied, appeared in 3.

*Married women assigned by husband's occupation.

†Women constantly outnumber men in the York Clinic.

In the social sphere, difficulties leading to the attempt were marital trouble (4 cases), unhappy love affairs (4), alcohol (4), dissatisfaction with job (3), debts and money worries (2), loss of job and pregnancy (1 each). (Secretary aged 24, in good social position, took overdose of pentobarbitone sodium following broken-off love affair. Suicidal gesture at age 17, depressed for some months following broken engagement at age 21.)

Previous Psychiatric History.—Six of these patients had been under treatment in York Clinic before (2 of them once, 2 twice, 1 six times, and 1 ten times) and several had had courses of E.C.T. Five had had out-patient psychiatric treatment, 3 had been admitted to a mental hospital (2 of them twice); none had gone to an observation ward. Four had made previous suicidal attempts (1 "several" times; and 1, a psychopath, five times). Suicidal threats and gestures were recorded in 3 cases. Only 5 of the 21 patients had no previous history of mental or emotional disorder. Psychiatric diagnoses made, in addition to the depression and paranoia already noted, were psychopathy (3), hysteria (4), alcoholism (2), and 1 each of hypochondriasis, epilepsy, addiction, and schizo-affective disorder. There was considerable diagnostic overlapping—for example, psychopathy and alcoholism, depression and hysteria, etc.

Treatment and Length of Stay.—The average length of stay for this group was 43 days (average length of stay, all patients, York Clinic, 1957, 45 days). The range was from 3 days (2 patients) to a stay of 187 and another of 121 days (both psychopaths). Four patients stayed 10 days or less, two of them taking their own discharge. Psychiatric treatment given was sedation (14 patients), E.C.T. (9), psychotherapy (10), modified insulin (3), other (4); observation without specific treatment (2). Not all patients were co-operative with the medical recommendations.

Disposal and Later Follow-up.—It is general practice in the York Clinic for patients to be given an out-patient appointment two to three weeks after discharge, and 11 of this attempted-suicide group were discharged home with a definite appointment made. The remainder were dealt with as follows: home in care of relatives (7), home and referred back to G.P. (2), transferred to mental hospital as voluntary patient (1). Follow-up information available one year later on 9 of the 11 patients admitted in 1956 showed that 6 were well (2 had since married), 1 had been readmitted twice for further treatment, and 2 had finally succeeded in taking their lives.

Characteristics of Group 3 (York Clinic Admissions)

These patients, on the whole, were vulnerable immature people. They showed marked emotional instability, low tolerance for stress, and an inability to handle personal relationships. They involved themselves in divorce (4 out of the 20 had had previous marriages dissolved), in unsatisfactory pre- and extra-marital affairs, in marital strife and jealousy. Their life histories often showed a pattern of immature hysterical behaviour, and at least four of the attempted suicides in the group appeared to be of a histrionic attention-compelling nature. In a number of cases menopausal factors were considered significant (7 of the 17 women were aged between 40 and 60). A common picture was that of a married woman, childless or whose children had grown up, lacking occupation and lacking inner resources, uncertain of her husband's affection. Another feature of the group was the easy availability of drugs: many patients were on barbiturates already, prescribed by psychiatrist or G.P. (patients often arrive in the clinic with large supplies in their possession).

Three patients showed all the resistance to help of the psychopath: two had wrought a trail of havoc in their lives (and those of their distracted relatives) with drink, drugs, abortion, financial irresponsibility, and repeated though half-hearted attempts at suicide; the third, determined on self-destruction, made two ingenious attempts while still in the clinic, and succeeded in killing herself six months later, a few days after discharge from a mental hospital. While the depressive states which led up to a suicidal attempt could be treated and relieved in the clinic, for many of these patients the attempt was but one fact of a malignant underlying character disorder.

Police Intervention and Hospital Policy

In England and Wales, though not in Scotland or in any European country, attempted suicide is still a criminal offence. It is therefore the duty of the police to charge all such cases that come to their notice and to bring them before the court. In 1956, 5,387 attempted suicides were known to the police: the actual number is very much higher, since many are admitted to hospital or receive medical attention without reference to the police. Of the 55 attempted suicides arriving at Guy's in 1957,* only 13 were recorded as known to the police when brought in, and none were subsequently reported by the hospital staff. It is no part of medical ethics to disclose confidence of this sort; and, as Keith Simpson (1947) observes, "suicidal attempts will not be less likely to recur because the doctor sees that the wretched victim is haled to court and charged with the offence." The interests of the patient appear better served by treatment than by retribution.

At Guy's, when the police are involved in a case, it is customary for them to accompany the patient to hospital and leave him in medical hands. During 1957 a detention notice was issued in respect of five ward patients and two York Clinic patients: this notice, sent to the superintendent's office, states that the patient is a prisoner and that the police station must be informed before the patient is discharged. After inquiries at the hospital (in one case by telephone) no further action was taken in any of these cases, and the detention notice was formally cancelled.

If a police officer wishes to take a bedside statement from a patient it is the practice at Guy's to request that the officer attend in plain clothes; if the patient is a woman, a woman officer is sent. Although the house-physician and ward sister do their best to make the interview as little disturbing as possible, it was recorded in one patient's notes that "Mrs. F. is very depressed because of a visit from the police." No patient, to anyone's recollection, has ever been charged from Guy's, but not all hospitals are so considerate. In the Epps series of 100 women sent to Holloway Prison for attempted suicide, 75 had gone straight to court from a general hospital (16 of these were teaching hospitals: Guy's was not among them) (Epps, personal communication). Hospitals having a psychiatric department would be more likely to make use of the mental health services for the care and disposal of these patients than hospitals not so equipped.

Police practice varies too from one district to another: in Southwark, which has Guy's Hospital in its area, attempted suicides are never charged except "as a last resort," and then only when it appeared that there was no other way of bringing the person (who might be a chronic alcoholic, or someone who had made repeated previous attempts) under proper care. Of the 13 cases known in Southwark during 1957, seven were taken to Guy's, two to Lambeth Hospital, and the remainder were dealt with by the duly authorized officer or sent home. There is no ruling where any particular attempted suicide casualty should be sent: it is left to the ambulance drivers to select the nearest hospital, or the one that the patient or relative requests. Hospital admissions therefore do not necessarily correspond with the police or ambulance division of the metropolitan area in which the hospital is situated.

Where York Clinic admissions are concerned it will be apparent that social class is a discriminating factor in police intervention. The patient whose doctor and relatives are in a position to arrange a discreet admission to hospital is unlikely to suffer the indignity of a police interview at his bedside or run the risk of a court appearance. Few patients, in fact, appear to know that attempted suicide is a criminal

*Includes the 11 York Clinic admissions in 1956.

offence; and, even if they did, this consideration is not likely to enter their minds at the time of the attempt.

Discussion

The findings of this study provide additional evidence that individuals attempting suicide, whether in Stockholm or South-east London, Edinburgh or St. Louis, have many characteristics in common. There is a constant excess of women (Guy's, 69%); the preferred method is barbiturate poisoning (Guy's 63%; South Hospital, Stockholm, 73% (Ettlinger and Flordh, 1955)); and a high proportion display psychiatric abnormality (of the 109 cases in the St. Louis series (Robins *et al.*, 1957) the authors say "there were probably no psychiatrically well patients in the entire group"; the Swedish study found "signs of aberrant personality" in 66%). Many will have made previous suicidal attempts, in particular the sufferers from psychopathic states, epilepsy, and hysteria (previous attempts in the Dulwich series, 21%; 45%, among the group of psychopaths in the Edinburgh study, reported by Batchelor, 1954b). Alcohol is a frequent precipitant: since indulgence generally takes place in the evening, more suicidal emergencies may be expected to reach hospital at night (14 of the 24 ward admissions to Guy's were brought to the casualty department after 6 p.m.; at the South Hospital, Stockholm, the peak time of arrival was also between 6 p.m. and midnight). Many will reveal a history of persistent social maladjustment and of hysterical modes of reaction. Attempts made by the old, by those of good previous personality, or in a setting of psychotic depression are more likely to achieve a fatal outcome. The relative absence of patients of this type in the group under study supports the concept outlined by Stengel and Cook (1958) of two differing populations: those who attempt and those who commit suicide.

It would be a counsel of perfection to suggest that all attempted suicide emergencies arriving at a general hospital should be admitted and fully investigated before discharge. The casualty officer has to make his decision in the light of the physical condition of the patient and the limited number of beds at his disposal. It would be equally impracticable to recommend that all such patients, once admitted to the general wards, be transferred as a routine to the psychiatric unit: shortage of beds is again the limiting factor. The South Hospital in Stockholm has met this problem of the initial reception of acute cases (not confined to attempted suicides) by providing a 10-bedded admittance ward with a maximum observation period of 24 hours. Appropriate measures of treatment can then be decided in consultation with the psychiatric department, and the medical and surgical units, if required; and transfers to other hospitals arranged (50% of the 500 attempted suicide cases coming to the admittance ward were referred for psychiatric inpatient care, 30% of them in the South Hospital's own unit).

At Guy's, as in any busy general hospital, it is inevitable that the criteria for retention of an attempted suicide patient in the wards is the somatic rather than the psychic gravity of his condition. But, since all suicidal behaviour implies some degree of mental disturbance, it would seem advisable that these patients, however brief their stay, should have the benefit of a psychiatric interview.

A study of this nature leaves the observer with an overwhelming sense of the unhappiness and frustration in which these unfortunate people live their lives. Handicapped as most of them are by an unfavourable mental and emotional constitution, often friendless and alone, when stress becomes intolerable they seek solace in alcohol or oblivion in drugs. To dismiss in a contemptuous manner some of their unsuccessful suicidal attempts as "not serious" or "hysterical" is to fail to understand the meaning of the act, its significance (often totally unconscious) as a desperate and final appeal for help. Admission to hospital and referral for psychiatric investigation enables such help to be mobilized where required; it may even prevent a repetition of the attempt if the patient's life situation is explored and he is assisted to make a more satisfactory adjustment.

In this clinical scene police intervention, however tactfully conducted, is irrelevant and in no way helpful. If, as is argued, compulsory powers must be retained to ensure that unwilling attempted suicide cases undergo treatment, this can far better be achieved by recourse to the duly authorized officer than by taking the patient to court. With the present development of the mental health services, and the more general understanding of suicidal behaviour as a symptom of mental disorder, punitive measures are seen to be inappropriate and unnecessary. Two recent editorials in the medical press (*British Medical Journal*, 1958; *Lancet*, 1958) have condemned the existing law and urged its reform. The latter journal sums up in these terms: "It seems clear that this outdated law is as inconsistent and inequitable in its application as it is damaging in its effects. Its virtues are hard to discover: its vices are blatant. The sooner it is done away with the better." The study of these 55 attempted-suicide patients who came to Guy's endorses that trenchant conclusion.

Summary

A series of 55 patients coming to a general teaching hospital following a suicidal attempt is described, and their reception, treatment, and disposal are analysed.

Approximately 18% were transferred elsewhere on arrival, 45% were admitted to the general wards, and 37% were admitted direct to the psychiatric unit (York Clinic). The preferred method of the suicidal attempt in all three groups was barbiturate overdose (63%) followed by other poisoning (17%).

The group of patients dealt with by the casualty department was found to contain a very high proportion of mentally handicapped and unstable individuals, of poor social background, living in poverty. More than half were aged between 50 and 70. Isolation, alcohol, marital friction, money worries, and physical illness were the chief precipitants of the attempt.

In a comparable group of private patients, social difficulties were minimal, but psychiatric illness appeared in excess. Many had previously been under psychiatric care; depression, hysteria, and personality disorder formed the setting of the attempt. Immaturity and inability to handle personal relationships were marked; easy access to drugs was another feature.

Patients admitted to the general wards stayed an average of 11 days; those admitted to the psychiatric unit, whether N.H.S. or private, 43 days. Referral for psychiatric opinion would be justified in every case of attempted suicide coming into hospital.

Police action was never initiated from the hospital. Criticism of the present law with regard to attempted suicide is inevitable in the context of these findings.

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REFSUM'S SYNDROME AFFECTING A BROTHER AND TWO SISTERS*

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A familial syndrome with the descriptive title " heredopathia atactica polyneuritiformis " was first described by Sigvald Refsum (1946) in Norway. Five cases in patients ranging in age from 25 to 41 years occurred in two unrelated families. A similar condition occurring in children was reported by Refsum *et al.* (1949); four cases in three unrelated families were described. A single case report has been published in this country (Clarke and Critchley, 1951), but, so far as we can discover, no other instance of this rare condition has been reported in the British Isles.

This paper records three further cases occurring in a single family.

The Clinical Syndrome

The syndrome is characterized by the following components: (*a*) Atypical retinitis pigmentosa—pigmentary changes are usually insignificant or absent—with night blindness and concentric limitation of the visual fields. (*b*) A chronic polyneuritic-like picture with progressive pareses of the limbs distally. This is associated with cytoalbuminological dissociation in the cerebrospinal fluid, very high levels of protein being achieved in many cases. (*c*) Ataxia, nystagmus, and other cerebellar manifestations. These may be very pronounced, so that a diagnosis of Friedreich's ataxia is often mistakenly made. (*d*) Other neurological abnormalities, which are not constantly found, include a neurogenic type of deafness, abnormalities of the pupillary reactions, and anosmia.

Among other findings, which are frequently associated with the retinal and neurological pictures, are ichthyotic skin changes and abnormalities in the electrocardiogram. These latter are of many varieties and include increase of the P–Q interval, nodal and auricular extrasystoles, alterations in the QRS complex, and sinus tachycardia. Sudden death is not infrequent in cases of Refsum's syndrome, and a cardiac basis has been postulated. In no case has there been clinical or *x*-ray evidence of cardiac enlargement. Consanguinity has been present in practically every instance. The high incidence of consanguineous marriages is strong evidence in favour of recessive heredity.

Differential Diagnosis.—Among the differential diagnoses which have to be considered are the hereditary ataxias of the Friedreich type, peroneal muscular atrophy, and hypertrophic interstitial polyneuritis (the Dejerine–Sottas syndrome). The Laurence–Moon–Biedl syndrome can be readily ruled out, the only common factor in the two conditions being retinitis pigmentosa. The juvenile form of amaurotic familial idiocy (Tay–Sachs disease) also comes under consideration because of the retinal changes which occur.

Pathology.—Understandably, few necropsies have been carried out (Refsum, 1946; Reese and Bareta, 1950). The main abnormalities have consisted of fibrous thickening and infiltration of the leptomeninges by lipid macrophages, moderate fatty degeneration of peripheral nerves, with axonal changes in the anterior horn cells of the spinal cord, and degeneration of the fibre tracts from the pontobulbar region to the cerebellar white matter. No inflammatory changes have been described. In one adult case in which the peripheral nerves were examined, changes characteristic of hypertrophic interstitial neuritis were found (Reese and Bareta, 1950).

Case 1

In May, 1953, a man aged 21 developed an influenza-like illness of sudden onset characterized by general malaise, anorexia, pains in the limbs and back, productive cough, and low-grade pyrexia. These symptoms persisted for two weeks before he observed any muscular weakness, pain being the dominant feature, increasing in severity and causing insomnia. Weakness appeared simultaneously in all four limbs, although the legs were more severely affected than the arms, so that in a few days he was unable to stand or walk. He was admitted to hospital.

Physical examination showed a normally developed man of 21. There was nothing remarkable on general examination except for slight thickening and scaling of the skin of the hands and feet. There was bilateral pes cavus but no other skeletal abnormality.

Examination of the cranial nerves revealed the presence of anosmia, bilateral optic atrophy, concentric constriction of the visual fields on testing by confrontation, and fine horizontal nystagmus on lateral gaze to right and left sides.

He had generalized wasting of the upper and lower limbs of slight degree and weakness of all muscle groups, most marked distally. The respiratory musculature was not involved. Fibrillation was not seen in the weakened muscles. Muscular hypotonia was present in both arms and legs. Slight ataxia was observed in the upper limbs on performing finger–nose–finger tests and a terminal intention tremor was demonstrable. Weakness was too pronounced in the lower limbs to enable any assessment of co-ordination to be made. The tendon reflexes were universally absent. Abdominal cutaneous reflexes were easily obtained and the plantar responses were flexor in type. Sensory changes were absent except for loss of vibration sense in the legs and impairment of joint-position sense in both feet. The sphincters were controlled. He was thought at that time to be a case of Friedreich's ataxia with an exacerbation of symptoms following an attack of influenza.

During the next four to five months he improved considerably, and by the end of that period could discern no weakness in his upper limbs. Power had also improved in the legs and was virtually normal, except at the ankles. There was bilateral foot-drop, and active dorsiflexion at the ankle was absent. The tendon reflexes had returned in the arms, but knee- and ankle-jerks were unobtainable. Nystagmus was no longer present, and the fundi, which had been clearly visualized before, were no longer visible because of lens opacities.

On reply to direct questioning he now admitted to inability to see in the dark. This symptom had been present for many years.

Ophthalmological Report.—" There are opacities in the posterior part of each lens. The disks show waxy pallor and there is a fine retinal degeneration in all areas in both fundi. There is not a marked degree, but fine pigmentation is visible. The case is considered to be one of retinitis pigmentosa."

On August 28 lumbar puncture was performed and clear fluid obtained under normal pressure. Considerable elevation of protein content without concomitant rise in leucocytes was revealed (see Table).

A triple athrodesis, with bilateral tendo-Achillis lengthening, was carried out with considerable benefit to the patient.

He was seen from time to time as an out-patient and remained in good health until December, 1956, when he

*Based on a communication given to the Association of British Neurologists, November, 1957.

Cerebrospinal Fluid Analysis in Case 1

August 28, 1953	..	R.B.C. 0/c.mm.; W.B.C. 2/c.mm.; protein 450 mg./100 ml.; globulin ++; W.R. negative; Lange 1122342100.
August 3, 1954	..	R.B.C. 123/c.mm.; W.B.C. 2/c.mm.; protein 150 mg./100 ml.; globulin +; Lange 1122210000.
August 6, 1955	..	R.B.C. 0/c.mm.; W.B.C. 2/c.mm.; protein 60 mg./100 ml.; globulin trace; Lange 1122110000.
August 20, 1957	..	Cells nil; protein 120 mg./100 ml.; globulin +; Lange 1112233100.

Electrophoresis of C.S.F. protein showed the relative proportions of the various fractions to be within normal limits.

had a recurrence of weakness and root pains in the upper limbs with aggravation of the existing weakness in his legs. There was no history of any preceding upper respiratory infection on this occasion. Over a period of four to five months power gradually returned, and in May, 1957, there was virtually no change from the previous examination except for the disappearance once more of the tendon reflexes in the upper limbs. Examination of the cerebrospinal fluid at this time revealed that this clinical exacerbation had been accompanied by further elevation of protein content of the fluid. It was felt that he was a case of the syndrome described by Refsum.

He has remained in good health and was able to get about quite normally wearing surgical boots.

Other Investigations.—Serum calcium, 10.3 mg.; serum phosphorus, 4.6 mg./100 ml.; blood urea, 32 mg./100 ml.; serum lipids, 680 mg./100 ml. Urinary porphyrins, no evidence of abnormal porphyrin excretion. Urinary chromatogram, normal amino-acid pattern. Serum electrophoresis, serum protein distribution within normal limits and the pattern normal. Electrophoresis of C.S.F. protein: very marked rise in beta- and gamma-globulin (July 24, 1957). E.C.G., normal. Predicted Q–T, 0.383 sec.; actual Q–T (average), 0.34 sec. Audiogram normal.

Comment.—This case demonstrates some of the pitfalls in the diagnosis of the syndrome. The patient was originally thought to be a case of Friedreich's ataxia in spite of the history of acute onset of the condition. Following examination of the C.S.F. the diagnosis was altered to one of acute idiopathic polyneuritis and retinitis pigmentosa. It was not until his second attack of polyneuritis that the correct diagnosis was made and examination of the siblings arranged.

Case 2

A married sister, aged 23, of the above patient was first seen in June, 1957, when an ophthalmological examination was carried out and a clinical examination performed. She had no complaints whatever at this time and had come to hospital at our request. On direct questioning she admitted to poor vision at night for many years. She had been unable to ride her bicycle after dark since about four years previously.

On examination there was no pes cavus, but the second and third toes of both feet were webbed with "hammer-toe" deformity, the fourth toes being abnormally short. The skin of the extensor surface of the arms and legs was thickened, rough, and scaling, and there was extensive ichthyosis of the anterior thorax and abdominal wall. Neurological examination was normal except for absent ankle-jerks and concentric contraction of the visual fields.

Ophthalmological Report.—"Posterior lens opacities. Fundi rather atrophic. No pigmentation, but fine pepper-and-salt appearance. Slit-lamp—opacities in posterior cortex. Rounded nodule just behind nucleus and radiating striae." Fields plotted on the perimeter showed marked concentric contraction.

The patient was admitted to another hospital on July 16 with the following history. About six weeks previously she had developed an illness which was diagnosed as influenza. This consisted of cough without sputum or haemoptysis but associated with anorexia and loss of weight. A week later she observed weakness and paraesthesiae in the form of "pins and needles" in her legs. At first the weakness was evident only after heavy exercise such as cycling or walking uphill. It was, however, steadily progressive, so that by the end of a month she was quite unable to stand or walk. At this time weakness also occurred in the upper limbs and progressed. Within 10 days voluntary power had been lost completely in the arms.

The weakness was accompanied by severe shooting pains in the arms and legs. These kept her awake at night and at times caused her to weep. They flitted from limb to limb, not remaining in any one site for more than a few minutes. She was transferred to the Royal Victoria Hospital on July 29.

Physical examination at that time revealed that the patient was an ill, anxious-looking woman of 23 years. She had obviously lost weight. The ichthyosis previously noted, the retinal changes, and constriction of the visual fields were confirmed. General examination showed nothing remarkable except for a regular tachycardia of 120 beats a minute. The blood pressure was 115/70.

Examination of the central nervous system gave the following results. Cranial nerves—there was bilateral facial weakness of lower motor neurone type. Fibrillation was noted in the tongue, which was poorly protruded. There was weakness of the sternomastoids. She appeared to have no difficulty in swallowing or in clearing secretions. There was no palatal weakness. Flaccid paralysis of the limbs was present. The only voluntary movements possible were a few degrees of hip flexion and abduction of the shoulders. The muscles were generally wasted, with marked global wasting of the small muscles of the hands. Fibrillation was seen in the thenar and hypothenar eminences but not elsewhere. There did not appear to be any intercostal weakness. The tendon reflexes were all absent.

There was a "stocking and glove" area of diminution of light touch and pain sensation extending to the wrists and in the legs to the mid-calf. Vibration sense was impaired in the left hand and both feet. Muscle joint sense was lost in the hands and feet and impaired at the ankles and wrists. The plantar responses were not obtainable.

There was no change whatever in the patient's condition over the next week. She was greatly distressed by root pains, which were only partially relieved by injections of methadone ("physeptone"). It was decided to try the effect of steroid therapy. This was given in the form of prednisone, 5 mg. t.i.d. There was almost immediate relief of pain. On the second day of treatment she had an attack of coughing, collapsed suddenly, and died in a few minutes. A post-mortem examination was not permitted.

Investigation.—Blood urea 30 mg./100 ml.; serum cholesterol, 213 mg./100 ml.; serum lipids, 643 mg./100 ml.; serum electrophoresis, normal pattern with normal total protein. C.S.F.: clear fluid; protein 600 mg./100 ml.; globulin ++; W.B.C. 1; Lange 1112220000; W.R. negative. Urinary chromatogram, marked general amino-aciduria of cystinuric pattern. *X*-ray examination: spine, pelvis, left femur and humerus, and skull normal; chest showed normal pulmonary vascular pattern, but there was some increase in the size of the heart shadow, mainly on the left side. E.C.G., sinus tachycardia 120 a minute. T wave flat in limb leads and V3–6. Myocardial change.

Comment.—This case illustrates an acute onset of the condition, which might easily be diagnosed as acute infective polyneuritis both on clinical grounds and on cerebrospinal fluid findings. It also demonstrates the sudden and unexpected death which may occur, presumably cardiac in origin. An interesting finding was the cystinuric pattern of amino-aciduria.

Case 3

An unmarried sister aged 20 of the first two patients attended hospital with her sister in June, 1957, at our request. She was the youngest member of the family and had no complaints and no visual disturbance.

On examination she was small and thin. The feet were high-arched, with hammer-toes. Thickening and scaling of

the skin of the hands was noted. Neurological examination revealed no abnormality apart from bilateral absence of the biceps, triceps, and ankle-jerks.

Ophthalmological Examination.—R.V. 6+/36. L.V. 6+/36. Lenses clear. Retinae showed atrophic appearance with narrowed arteries. Disks slightly blurred but no pallor. Slit-lamp: slight exaggeration of sutures and few granular opacities in posterior halves of lenses. Fields of vision on perimetry showed gross concentric contraction.

Investigations.—C.S.F. clear fluid with normal constituents. Protein 30 mg./100 ml. Electrophoresis of C.S.F. protein showed a normal pattern. Urinary chromatogram normal.

Unfortunately we have not been able to examine the fourth sibling.

Discussion

The exact position of this syndrome among the heredofamilial ataxias is not altogether clear, nor has its position as a nosological entity been firmly established. It appears to be a familial condition with a recessive mode of inheritance; consanguinity has usually been demonstrable. In this family no evidence of consanguinity has been found (Fig. 1).

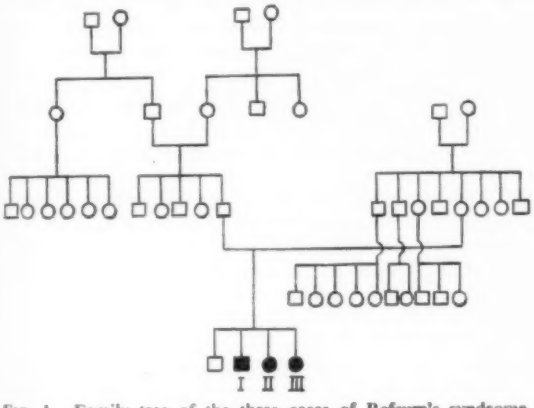

FIG. 1.—Family tree of the three cases of Refsum's syndrome. There was no evidence of consanguinity.

These cases also differed from the original description in some other respects. Progressive polyneuritis with distal paresis was not a feature. The attacks were of acute and subacute onset with considerable recovery in the first patient after each of two episodes. Clinical exacerbations were paralleled by elevation of the C.S.F. protein. In the third case, with no symptoms and few signs, the protein content of the fluid was normal.

An additional finding, which does not appear to have been described previously—namely, a complicated type of posterior lens opacity—was noted. This was felt to be a complication of the retinitis pigmentosa. The discovery of amino-aciduria in the second patient was of interest, and again this had not been noted in other cases (Fig. 2). It was not present in the other siblings tested, and would therefore appear to fall into the group of cystinuria where the abnormality is inherited in a Mendelian recessive fashion (Harris *et al.*, 1955). The amino-aciduria is not likely to be related to the neurological disorder, as its presence was not demonstrable in other cases showing the full clinical picture. One is reminded of the cases of cerebellar ataxia of a reversible type associated with photosensitivity of the skin and amino-aciduria, so-called "H" disease, which have been described recently (Baron *et al.*, 1956). The resemblance between the two syndromes is, however, purely superficial, the skin lesions being quite different and the pattern of amino-aciduria dissimilar. Cyto-albuminological dissociation was present in some of the cases of "H" disease and all the cases affected showed the typical urinary excretion of amino-acids.

The differential diagnosis has been discussed at length in the original communications and will not be gone into fully here. The condition which Refsum's syndrome may most closely resemble appears to be chronic hypertrophic interstitial neuritis or progressive hypertrophic neuritis (Dejerine–Sottas disease). This latter condition in addition to showing the classical features of polyneuritis has, in not a few instances, exhibited nystagmus, intention tremor, kyphoscoliosis, and sluggish or fixed pupils. Furthermore, a special variety is distinguished by remissions and exacerbations (Rossolimo, 1899; Nattrass, 1921; Harris and Newcomb, 1929); and in a few cases elevation of the C.S.F. protein without concomitant increase of cells has been discovered (Wolf *et al.*, 1930; Wilson, 1954). The C.S.F. findings in most cases have been entirely normal. The post-mortem findings in one case of Refsum's syndrome have been typical of progressive hypertrophic neuritis. There was no palpable thickening of nerves in any of the present cases, and nerve biopsy was not carried out. It should be remembered, of course, that absence of nerve thickening by no means excludes the diagnosis of hypertrophic neuritis.

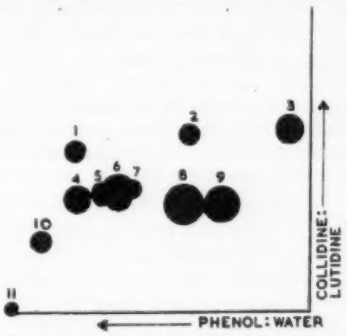

FIG. 2.—Amino-acids in Case 2. 1, valine; 2, taurine; 3, cysteic acid (from cystine); 4, β-amino-isobutyric acid; 5, histidine; 6, hydroxyproline; 7, alanine; 8, glycine; 9, glutamic acid; 10, arginine; 11, "nephrosis peptide." The circle areas are proportional to the densities of the spots on the developed chromatogram.

In spite of the close resemblance to other neurological disorders, and, in particular, the syndrome of progressive hypertrophic neuritis, the constant association of retinitis pigmentosa and elevated C.S.F. protein in Refsum's syndrome seems to distinguish it from other conditions.

There was radiological and electrocardiographic evidence of myocardial disorder in the second case. While we feel that treatment was of too brief duration to have had any contributory effect to the fatal outcome, it might be wise to use steroid hormones cautiously in these cases.

Summary

Three cases of Refsum's syndrome in a family are described. The differential diagnosis, particularly with regard to Dejerine–Sottas disease, is discussed.

Cystinuria was present in one patient, and was thought to be unrelated to the main condition.

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ZOSTER SINE HERPETE

BY

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A review of the extensive literature on zoster reveals that infection with the zoster virus may produce more than a localized reaction due to involvement of the sensory arc in one or two segments. The pathological process may extend to the anterior horn and nerves and, more rarely, to viscera and autonomic nerves, to the meninges, and to the central nervous system in an extensive and even fatal manner.

In the course of a clinical study of 120 cases of zoster seen in a group of general practices a number of patients presented symptoms and signs highly suggestive of zoster but without a rash, a condition which has been recorded previously by a few observers and which was termed "zona fruste" by Widal (1907) and "zoster sine herpete" by Weber (1916).

Zoster sine herpete may present as a variety of syndromes. From the present study it would appear that these syndromes are far less rare than the very few instances recorded in the literature would lead one to suppose.

Types of Pain

Important in the recognition of some of the syndromes of zoster sine herpete is an appreciation of the character of the pain in zoster. This is of two types: a deep boring or twisting pain arising in muscles, joints, ligaments, etc., usually associated with tenderness of these structures to pressure, which has been termed "sclerotomal pain"; and a superficial, burning or prickling pain, usually with associated hyperaesthesia, arising in or near the skin and termed "dermatomal pain." Both types of pain occur in most patients, but either may be present without the other. When both varieties are present the sclerotomal pain usually precedes the dermatomal pain by a few days, occasionally by a week or two. It is the early onset of sclerotomal pain with its associated muscle tenderness that occasionally leads to erroneous diagnoses of renal or intra-abdominal disease in the pre-eruptive phase of zoster.

The pain of zoster usually subsides in from two to six weeks, but in a few individuals, particularly those of advanced years or unstable personality, the superficial pain may persist and develop into a post-herpetic neuralgia. Two types of pain—deep and superficial—also occur in zoster involving the seventh cranial nerve, but either type may occur without the other. Severe, deep, stabbing pain, believed by Hunt (1910) to be due to involvement of the middle ear, may occur. It is distinguished from the pain of bacterial infection of the middle ear by the normal appearance of the drumhead. It commonly precedes the superficial pain by a few days. The superficial pain precedes or accompanies herpetic involvement of the auricle or auditory canal, and may be felt deeply in the ear when the auditory canal or tympanic membrane is involved. It is more constant than the middle-ear pain, and burning in character, but subject to waves of exacerbation, particularly when the involved area is touched, as by an auriscope. Radiation of this pain in the direction of the throat or tonsil is common, and when the pain is very severe it may radiate to the trigeminal, occipital, and cervical areas.

In the whole field of infectious disease subclinical and incomplete forms are known to occur, and in some they are common. The Schick-negative adult who has neither been immunized against diphtheria nor suffered a clinical attack of diphtheria is commonplace, and most adults are tuberculin-positive without having suffered from overt tuberculosis. Scarlet fever now quite commonly presents as a mild sore throat without tongue signs or rash, the diagnosis being made in retrospect two or three weeks later, when peeling of the hands and feet is noted. In the realm of virus infections the subclinical form is known to be the rule in poliomyelitis, and during epidemics of chicken-pox and rubella it is not uncommon to see a susceptible close contact develop a mild pyrexial illness within the incubation period of that disease with none, or only some, of its classical symptoms and signs. Thus, rubella is sometimes seen as a mild diffuse or localized lymphadenitis without rash, and often without pyrexia or malaise; and chicken-pox as a mild fever without rash, or with only an odd vesicle or two on the scalp or within the oral cavity. Most of these cases would be undiagnosable but for their appearance in the midst of an epidemic. In the same way there is little doubt that zoster may present in a variety of ways without the characteristic rash, but the diagnosis is made difficult because epidemics of zoster, in the accepted sense, do not occur.

Zoster is characterized by segmental pain and segmental rash, sometimes with the addition of associated signs such as eye lesions, visceral involvement, or muscle paresis. It is believed that cases of zoster may occur in which only one of these features is present, and when the rash is absent diagnosis becomes difficult. In the presence of characteristic symptoms without a rash the finding of a C.S.F. lymphocytosis, with or without a slight increase in protein, adds a little weight to the diagnosis. However, these changes are not specific to zoster, and in many cases of typical zoster the C.S.F. is normal.

Pain in a Different Segment Without Rash

It is not uncommon to see examples of zoster in which the diagnosis is not in doubt, since segmental pain and typical rash are present, but in which the same type of pain occurs in another segment but without rash, in the course of the same illness. Thus Morey (1946), in recording his own experience of an attack of herpes oticus, describes severe painful hyperaesthesia in the whole of the cutaneous distribution of the Gasserian ganglion of the same side, but without a rash in this area. This he attributed to involvement of the Gasserian ganglion without eruption. Watson (1941) described a case of zoster involving the seventh, eighth, ninth, and tenth cranial nerves, with severe pain in the face in the distribution of the maxillary nerve but without a rash in this area. He regarded this as indicating minor involvement, sufficient to produce pain but not sufficient to produce vesiculation. Porteous (1947) described a case in which severe knife-like pains in the right shoulder and arm were associated with a typical vesicular eruption in the distribution of the tenth thoracic nerve on the left side. The following are examples of many cases seen which illustrate this phenomenon.

Case 1.—A woman aged 50 developed a typical attack of zoster with pain, hyperaesthesia, and typical cutaneous lesions on the right side of the chest wall in an area corresponding to the cutaneous distribution of the fifth thoracic nerve. On the seventh day, as the lesions were drying, she developed precisely the same type of pain and hyperaesthesia in the cutaneous distribution of the fifth thoracic nerve on the left side. No herpetic lesions developed on the left side, and the pain lasted only one week.

Case 2.—A man aged 28 developed soreness and hyperaesthesia over the right neck and shoulder and a severe boring pain in the left side of the neck. On the second day typical cutaneous lesions of zoster appeared over the right shoulder in an area corresponding to the cutaneous distribution of the third and fourth cervical nerves, but his main complaint still was of severe pain felt deeply in the left side of the neck. This pain was aggravated by movement of the neck or shoulder. By the fourth day the deep pain had subsided and in its place there was soreness and hyperaesthesia of the overlying skin, precisely similar to that which he had experienced on the opposite side. This disappeared within 10 days without the appearance of a cutaneous eruption.

Sclerodermal or Dermatomal Type of Pain

From consideration of cases such as these it is not difficult to visualize the occurrence of cases of zoster sine herpete characterized by segmental pain of sclerotomal or dermatomal type, or both, with or without associated general symptoms, and running a course of one to several weeks without the development of cutaneous lesions. This type of case was described by Widal (1907) and designated by him zona fruste. His patient was a man aged 38 who suddenly developed sharp pains on the left side of the chest with mild fever, anorexia, and headache, but without physical signs in the painful area or in the lung. This severe pain was localized to an area between the fifth and the eighth or ninth intercostal spaces, and was now aggravated by touch or pressure. Dilatation of the left pupil was also noted. His Wassermann reaction was negative. Lumbar puncture revealed a moderate lymphocytic pleocytosis. This patient was closely observed until symptom-free, but he did not develop any cutaneous lesions. The following cases show the same type of clinical picture and course.

Case 3.—A man aged 44 complained of the sudden onset of severe aching pain in the left thigh, aggravated by walking and associated with mild general malaise. By the third day the pain was less severe and he was able to walk without limping, but he had developed soreness and tenderness of the lateral aspect of the left thigh extending up to the buttock, in an area corresponding to the cutaneous distribution of the second and third lumbar nerves. Examination revealed marked hyperaesthesia in this area and tenderness to compression of all parts of the left thigh. Radiography of the left hip-joint, pelvis, and dorso-lumbar spine showed no abnormality. By the fourteenth day there was very little residual pain or hyperaesthesia, but slight aching in the thigh after cycling or walking persisted for three months.

Case 4.—A woman aged 54 developed a deep ache extending in a band round the left chest wall in an area corresponding to the cutaneous distribution of the fifth thoracic nerve. It was not aggravated by movement, respiration, or the pressure of clothing. It remained relatively mild for two weeks, then became more severe and accompanied by superficial soreness. Examination at this stage revealed marked hyperaesthesia in the painful area but no abnormality of the lungs or spine. The pain remained severe for a further week, then abated rapidly. She was symptom-free one month from the onset.

Case 5.—A woman aged 47 gave a history of five days' deep boring pain in the left flank, "like a twisted muscle," and of two days' soreness extending round the left side of the abdomen. The deep pain was aggravated by any movement of the trunk, and the superficial pain by the contact of clothing. There was anorexia and general malaise. Examination revealed a band of hyperaesthesia extending from the left lumbar region round the left side of the abdomen, in an area corresponding to the cutaneous distribution of the eleventh and twelfth thoracic nerves, with tenderness and guarding in the left renal region and to a lesser extent in the left iliac fossa. Pulse and temperature were normal and the urine showed no chemical or microscopical abnormality. During the next four days the deep pain and guarding disappeared rapidly and the hyperaesthesia became less marked. One month from the onset she still experienced slight aching in the left renal region after a hard day's work, but this had disappeared entirely after a further month.

Case 6.—A man aged 69 gave a history of three days' general malaise and severe pain in the right upper chest. The pain was getting worse and preventing sleep. It was described as a continuous deep ache. Examination revealed neither tenderness to pressure nor hyperaesthesia in the painful area. He had a right-sided Horner's syndrome and scattered varicelliform lesions on the chest, back, and face, but was not aware of the presence of either. Heart and lungs were normal and movement of the cervical spine was full, free, and painless. Three days later he had vesicular and pustular lesions indistinguishable from those of varicella scattered over the chest, abdomen, and back, with a few lesions on the legs, arms, face, and scalp, and a single vesicle on the soft palate. By the tenth day his pain was much less severe and the lesions were all dry and inactive; the Horner's syndrome was unchanged. By the twenty-eighth day he was free from pain and felt well. Skiagram, differential white-cell count, and E.S.R. showed no abnormality. One year later the Horner's syndrome was unchanged.

In Cases 3, 4, and 5 the rapid onset with segmental pain of both sclerotomal and dermatomal type and general malaise was typical of the pre-eruptive phase of zoster and led one to predict the imminent appearance of cutaneous lesions. No cutaneous lesions appeared, but otherwise the illness ran a course typical of that of zoster, all patients being symptom-free within a few weeks. Case 6 presented with pain of the sclerotomal type only, there being no superficial pain or sensory change. The associated findings of an ipsilateral Horner's syndrome and a mild generalized varicelliform eruption are strong evidence in favour of a diagnosis of zoster.

Painful Muscle Paresis of Obscure Origin

Weber (1916), in his classical paper on muscle paresis due to zoster, suggested that certain examples of painful muscle paresis of obscure aetiology might be regarded as zoster sine herpete. The following are examples.

Case 7.—A woman aged 50 suddenly developed severe aching, felt deeply in the left thigh and buttock and aggravated by active or passive movement of the hip-joint. There was no history of trauma and no complaint apart from the pain. Tenderness was felt to pressure over the greater trochanter and to compression of the thigh. A small area of hyperaesthesia was present over the front of the thigh near its mid-point. Three weeks from the onset the pain in the thigh was still severe, but movement of the hip-joint was less painful. Weakness of flexion and of external rotation of the hip was now noted, with 1½ in. (3.8 cm.) wasting of the left thigh muscles. *X*-ray studies of the femur, pelvis, hip, and knee revealed no abnormality, and E.S.R. and alkaline phosphatase estimations were normal. After two months there was little change in the physical signs, but the pain was less severe; gradual improvement then took place. Six months from the onset wasting of the thigh could no longer be demonstrated, and power of flexion and of external rotation at the hip were normal.

That this syndrome may have been due to zoster is suggested by the segmental nature of the pain and paresis with absence of general symptoms, and the negative investigations. The pain and tenderness of the hip-joint in the early stages may have been due to zoster arthritis.

Case 8.—A medical practitioner aged 68 complained of rapid onset of severe aching which involved the left side of the lower chest and abdomen, aggravated by movement and by deep inspiration. Twenty-four hours later he noted hyperaesthesia of the overlying skin which increased rapidly in severity. By the next day the pain and hyperaesthesia were intense and he had general malaise, nausea, and hiccup. He lay in bed on his right side with his pyjamas and bedclothes carefully positioned to avoid contact with his left flank. His pulse and temperature were normal. Examination revealed an area of intense cutaneous hyperaesthesia extending in a band round the left lower chest wall and abdomen as far as the midline, in an area corresponding to the cutaneous distribution of the tenth, eleventh, and twelfth thoracic nerves. *X*-ray studies of the spine showed disk degeneration and osteoarthritic changes in the lower lumbar region but no abnormality of the thoracic spine. On the seventh day he noted a bulging of the lower part of the left abdominal wall with an impulse on coughing, and evident only when in the upright position. Examination showed this to be a pseudo-tumour due to paresis of abdominal muscles. The pain and hyperaesthesia remained very severe for the first 12 days, then abated slowly. Two months later he still had slight hyperaesthesia and occasional sharp stabs of pain; the pseudo-tumour was still evident but less marked. Four months from the onset he was free from symptoms and signs.

In this patient the distribution of the pain and hyperaesthesia was typical of zoster and led one to expect the appearance of a herpetic eruption; but none appeared, and no aberrant vesicles were found despite a careful search. Subsequently there was paresis of muscles supplied by the

same nerves. The hiccup complained of in the early stages was probably due to irritation of nerve twigs supplying the diaphragm.

Visceral Involvement

There is evidence in the literature that visceral involvement due to zoster may occur occasionally in the absence of cutaneous lesions. Duperrat (1945) described a case in which intestinal ileus occurred in association with cutaneous lesions in the distribution of the upper three lumbar nerves, whereas all other cases of ileus due to zoster have been associated with cutaneous lesions in the distribution of the lowest seven thoracic nerves. He expressed the opinion that this patient had involvement of the lower thoracic segments without cutaneous lesions. Curtin (1902) described a case of zoster in which cutaneous lesions on the face were associated with haematuria. Two years later this patient developed cutaneous zoster involving the lumbar region and associated with haematuria. He had no haematuria between these attacks nor for several years following the second attack. It is probable that the haematuria experienced during the first attack was due to a second focus of infection involving the lumbar segments but without cutaneous lesions in those segments. Darget (1929) described a case with symptoms of cystitis in which cystoscopy revealed an inflamed plaque bearing vesicles on the wall of the bladder. This patient had no cutaneous lesions.

In zoster involving the head and neck, it is common for several nerves or nuclei to be involved simultaneously, and, not infrequently, various functions of one of these nerves may be affected without the occurrence of an eruption in its cutaneous distribution. Thus, in one of the cases studied there were no cutaneous lesions of the auricle, auditory canal, or tympanic membrane in spite of involvement of the seventh, ninth, and tenth cranial nerves, all of which are believed to have cutaneous representation in these areas. In another case studied there was pain in the distribution of the maxillary and mandibular divisions of the fifth cranial nerve and in the ear, with facial palsy, diplacousis, and loss of taste on the anterior two-thirds of the tongue, yet there were no cutaneous lesions on the face, auricle, auditory canal, or tympanic membrane.

Ophthalmic Zoster

It is surprising how often there is evidence of partial involvement of other nerves in what appears to be a straightforward example of zoster involving a single cranial nerve. In the following example of ophthalmic zoster the presence of pain in the ear led to the finding of loss of taste sensation on the anterior two-thirds of the tongue, providing evidence of partial involvement of the seventh cranial nerve.

Case 9.—A woman aged 57 had suffered from an attack of thoracic zoster many years previously. She developed typical moderately severe left-sided ophthalmic zoster. Oedema and vesiculation were pronounced but the eye was not affected. Early in the attack she had felt some stabbing pains deep in the left ear, with pain spreading down to the neck. Examination revealed a large, tender gland in the neck and loss of taste sensation on the anterior two-thirds of the tongue on the left side. There was no facial weakness, abnormality of hearing or balance, or any eruption on auricle, auditory canal, or fauces. By the seventeenth day she was free from pain, all lesions were dry and inactive, and taste sensation had returned to normal. The only moieties of the seventh cranial nerve involved in this patient were those of taste and of sensation in the middle ear.

A few examples of ophthalmic zoster sine herpete have been described in the literature, the syndrome consisting of involvement of the eye or extrinsic eye muscles, or both, and often associated with pain in the cutaneous distribution of the ophthalmic division of the fifth cranial nerve, but without cutaneous lesions. Parkinson (1948) described a case of ophthalmic zoster followed by ptosis on the same side; he states that it is tempting to assume that certain of the cases of oculomotor paresis of obscure origin, especially when associated with ophthalmic neuralgia, might be due to zoster sine herpete. He quotes Mules (1903) as having previously made this suggestion. Ahlström (1904) described a case in which corneal zoster was the only form of involvement of the fifth cranial nerve in the course of typical cutaneous zoster of the lumbar plexus. von Hoffman (1880) described a similar case but without any cutaneous eruption.

Lederer (1900) described his findings in a boy aged 8 who gave a six-weeks history of headache and pain in the left eye. The eyelids were inflamed and there was marked photophobia and lacrimation, with considerable conjunctival and ciliary injection. The cornea was dull, particularly in its upper and outer quadrant, where there were numerous small vesicles containing clear fluid. The corneal reflex was absent, and enophthalmos and reduced tension were present. After seven weeks' treatment with atropine, heat, and galvanism vision was 6/6 and tension normal, but there was still slight enophthalmos, decreased corneal sensitivity, and two small opacities in the upper and outer quadrant of the cornea. Lederer regarded these eye changes as so typical of zoster that he thought the patient must have zoster without cutaneous lesions.

Ross (1949) described two examples of ophthalmic zoster without cutaneous eruption. After an initial short period of general malaise, both patients developed severe neuralgic pain over, in, and around the affected eye, with radiation into the occiput, malar region, and side of the nose. Both patients had pre-auricular adenitis, corneal anaesthesia, a disciform keratitis with ulceration and followed by superficial vascularization, oedema of the iris, and motor lesions of the third cranial nerve. The motor lesion was total and persistent in one, partial and of short duration in the other. In both cases the condition ran a pernicious course, with little response to therapy. One finally developed acute glaucoma and required enucleation; the cornea finally recovered in the second case, leaving a dense leucoma.

Ophthalmic zoster sine herpete is not always severe nor the prognosis bad; the following patient made an excellent recovery.

Case 10.—A woman aged 62 gave a three-days history of general malaise and of soreness, "like an inflammation," of the right side of the forehead and scalp, with frequent sharp stabs of pain felt in these areas and in the right eye. There was slight hyperaesthesia of the painful skin area, which corresponded to the cutaneous distribution of the ophthalmic division of the right trigeminal nerve. There was anaesthesia of the right cornea, and near the centre of the cornea was a single, round, circumscribed area of superficial infiltration about 2 mm. in diameter. Intraocular tension was normal and *x*-ray examination of the sinuses revealed no abnormality. Treatment consisted of analgesics by mouth and topical applications of hydrocortisone and chloramphenicol three-hourly for two weeks. Her symptoms remained unchanged for the first week but improved gradually during the second week. Six weeks from the onset the cornea was no longer anaesthetic and the corneal opacity had absorbed completely. Intraocular tension was still normal. She was free from pain but still felt slight numbness of the right side of the forehead.

Geniculate Zoster

Facial palsy so often complicates geniculate zoster that several writers have suggested that some cases of Bell's palsy without herpetic vesicles on the auricle, especially if associated with auricular pain, may be due to zoster sine herpete. Key-Aberg (1928) claims that this suggestion was first made by Antoni in 1919. It has since been suggested by Aitken and Brain (1933), Spillane (1941), and Engström and Wohlfart (1949). Using their complement-fixation technique, Aitken and Brain obtained positive reactions in all of a series of nine cases of geniculate zoster and in four out of 22 cases of Bell's palsy without eruption. Of these four cases, two had associated auricular pain, and one of these also had impairment of taste sensation. In the following two cases, believed to be due to geniculate zoster without a rash, there were typical painful symptoms without facial palsy, but with other evidence of involvement of the seventh cranial nerve.

Case 11.—A man aged 69, who had had ophthalmic zoster 30 years previously, suddenly developed severe stabbing pain, felt deeply in the left ear, with soreness and hyperaesthesia of the auricle. The pain radiated upwards to the temporal region, backwards over the mastoid process, and downwards into the neck. It was so severe that he was unable to rest by day or by night in spite of consuming large quantities of the common analgesics. Within 24 hours of the onset of pain he noticed that he could hear his clock ticking loudly as though it were "inside the left ear" and that he could not tolerate the wireless at its usual volume. The pain remained severe for 10 days, then became less severe and intermittent. By the 20th day the pain was insignificant but the hyperacousis was still very troublesome. Throughout this period the drumhead, auditory canal, auricle, fauces, and face remained free from eruption and he did not develop facial weakness, impairment of taste sensation, or evidence of labyrinthine involvement. Four months later his hyperacousis was unchanged, but after 12 months his hearing was normal apart from slight discomfort when subjected to excessive noise.

Case 12.—A man aged 72 complained of sudden onset of pain in the left ear, spreading downwards into the throat and upwards over the left half of the forehead and scalp. The pain was described as an incessant ache with a burning and prickling element, and it interfered with sleep by night and day. Examination revealed an intense hyperaesthesia in the whole of the cutaneous distribution of the left fifth cranial nerve and loss of taste sensation on the left side of the tongue in its anterior two-thirds. The pain continued to be severe for 10 days, then abated rapidly; taste sensation returned to normal in two weeks. Soreness and hyperaesthesia of the forehead and scalp were still present, and abated very gradually over a period of six weeks. At no time were there any lesions on the drumhead, auricle, auditory canal, fauces, or face, and there was no sign of facial weakness or labyrinthine involvement. Hearing was normal throughout, the temporal arteries felt normal for a man of his age, and x-ray studies of the skull and sinuses revealed no abnormality.

This patient would appear to have suffered an attack of zoster sine herpete involving both the geniculate and the Gasserian systems.

Acute Labyrinthine Involvement

Hunt (1910), noting the frequency with which symptoms and signs of cochlear or vestibular involvement may appear in association with zoster involving neighbouring ganglia, postulated that the cochlear or vestibular nuclei might be primarily affected in zoster, and that certain cases described as Ménière's disease or toxic labyrinthitis might be due to zoster sine herpete. The following case may be an example.

Case 13.—A man aged 56 complained of general malaise with severe stabbing pains in the right ear for three days. He was apyrexial, and no abnormality was discovered on examination of the drumhead, auditory canal, mouth, teeth, or fauces. There was no mastoid tenderness, taste sensation was normal, and hearing was good on both sides. The next day he suddenly developed severe vertigo with vomiting. He lay motionless in bed, the slightest movement of his head in any plane being sufficient to produce copious vomiting. There was coarse nystagmus; the otalgia was no longer present and did not recur. He remained in this state for four days, then improved rapidly. Examination at this stage revealed no facial weakness or impairment of hearing, and taste sensation was normal. There was no abnormality of sensation or co-ordination. He was able to return to work three weeks from the onset.

In this example of acute labyrinthine involvement a possible zoster aetiology is suggested by the rapid recovery and evidence of simultaneous involvement of the seventh cranial nerve. The latter is suggested by the onset with acute otalgia without physical signs in the ear or fauces, the otalgia preceding all other symptoms by three days.

Unilateral Paresis

Font (1952), in discussing the "jugular foramen syndrome" of unilateral paresis due to lesions involving the last four cranial nerves, expressed the opinion that some of these cases, in which there is no discernible cause, might be due to infection with the zoster virus. In the patient described by Negus and Crabtree (1943) and in the five patients described by Engström and Wohlfart (1949), laryngeal and pharyngeal paralyses were associated with herpetic lesions of the auditory canal, pharynx, and larynx, providing sure evidence of their aetiology. The latter authors point out that careful search should be made for vesicles in all unexplained paralyses involving the vagus nerve. In the case described by Alajouanine and Nick (1950), unilateral paralysis of the soft palate, pharynx, and larynx was associated with "herpes zoster cruralis," indicating that there was a second focus of viral infection resulting in motor disturbance of the vagus nerve without herpetic lesions. In one of the cases described by Font (1952) the nasopharynx was reported to have been acutely inflamed at the onset, but when the patient was seen by him on the sixth day there was no inflammation and no herpetic vesicles could be found. This patient had left-sided paralysis of the soft palate, pharyngeal muscles, and vocal cord, weakness of the left trapezius and sternomastoid muscles, loss of taste sensation on the left half of the tongue, and diminution of sensation on the left side of the soft palate, pharynx, and larynx.

Summary

According to the evidence presented, zoster sine herpete should be considered as a possible diagnosis in a variety of syndromes of obscure origin: (1) unilateral segmental pain of sclerotomal or dermatomal type, or both, with complete recovery in a few weeks; (2) certain painful unilateral muscular paresis of obscure origin; (3) unilateral segmental pain associated with certain visceral disturbances of short duration and complete resolution; (4) unilateral ophthalmic neuralgia with involvement of the eyeball, or with paresis of ocular muscles, or both; (5) unilateral otalgia without evidence of middle-ear disease and associated with facial palsy, hyperacousis, or loss of taste sensation on the anterior two-thirds of the tongue; (6) cases presenting as an acute labyrinthitis, or Ménière's syndrome, with evidence of involvement of adjacent nerves, particularly the seventh cranial nerve; and (7) unilateral paralysis of the soft palate, pharyngeal muscles, or vocal cord of obscure origin, especially when associated with otalgia or with an inflammatory reaction in, or around, the entrance to the larynx.

Zoster sine herpete is of more frequent occurrence than has been supposed.

I thank all those colleagues who have allowed me to study their cases of zoster, and in particular Drs. S. T. Anning, A. Fullerton, W. P. Goodyear, G. Johnson, R. H. Olver, and S. Thorburn. I also thank the librarians of the Leeds Medical School Library and the B.M.A. Library for their valuable assistance, and the librarian of the American Armed Forces Medical Library, Washington, for a microfilm copy of Widal's original paper. I am also greatly indebted to Dr. S. T. Anning for his advice and encouragement.

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SUCKING AND SWALLOWING IN INFANTS

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It is firmly embedded in tradition that infants obtain their milk by sucking. Objective evidence for this has been presented by workers who have recorded negative pressures in the mouth during feeding (Gunther, 1945; Hytten, 1951). However, there is a large body of opinion which maintains that infants express milk from the teat by a squeezing process. Support for this view has come from a recent cineradiographic study of bottle-feeding (Ardran *et al.*, 1958).

The present study was designed to reinvestigate this problem and also to define the swallowing mechanism of infants. The technique used, that of recording the intraluminal pressures of the pharynx and oesophagus, has already been extensively practised in the investigation of the adult swallowing mechanisms. For comparison with the present observations there are many recorded data on the adult pharyngo-oesophageal junction (Fyke and Code, 1955), oesophagus (Butin *et al.*, 1953; Dornhorst *et al.*, 1954), and gastro-oesophageal junction (Sanchez *et al.*, 1953; Fyke *et al.*, 1956).

Methods

The intraluminal pressures were recorded indirectly through open-tipped, water-filled "polythene" tubes attached to Hansen capacitance manometers. The tubes were of 1 mm. external diameter and 0.5 mm. internal diameter. Three tubes were used for simultaneous recording at different sites and were arranged so that either all three were fastened together with recording holes spaced at intervals of 2 to 4 cm. or two tubes were fastened together and the third was free to be placed at an independent site, usually in the mouth (Fig. 1).

Recordings were made during feeding by using a boat-shaped bottle (volume 250 ml.) with an opening at each end closed by a rubber teat. The tubes were passed through the bottle and teats via a central hole. A variety of milk flows were produced by punching additional holes in the teats. The flow rates were not accurately measured during each feed, but the teats were divided into three groups: high-flow teats passing over 36 ml. of milk a minute, moderate-flow teats passing 28–36 ml. a minute, and low-flow teats passing up to 28 ml. a minute on inverting the bottle. Maw's "anticolic" rubber teats were used in all experiments, the bulb diameter being 15 mm. and waist diameter 11 mm.

The tubes were passed through the mouth into the oesophagus and the infant began sucking immediately. During the recording the tubes were withdrawn in steps of 0.25 to 2 cm. from the stomach up the oesophagus and through the pharynx. Recordings were also made immediately distal to the teat and within the teat.

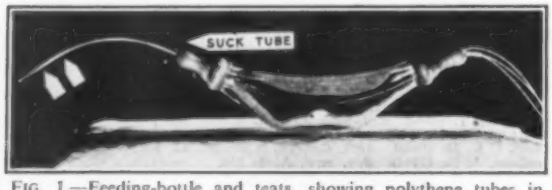

FIG. 1.—Feeding-bottle and teats, showing polythene tubes in position. Two tubes are fastened together, the recording holes indicated by arrows, and the third tube is positioned to record from the suck area.

Fourteen normal infants who were convalescent from minor disorders were examined. Their ages ranged from 5 weeks to 7 months. All were normally bottle-fed and recordings were made at the usual feeding-time with their customary volume and type of artificial milk.

Results

Sucking

Repetitive, negative-pressure swings were recorded from the mouth during sucking (Fig. 2). The magnitude of the pressure drop with each suck appeared to depend on the ease with which milk flowed from the teat. With low-flow teats average negative pressures of 120 to 230 cm. of water were recorded. As the milk flow increased the negative pressures tended to become less; moderate-flow teats were associated with average negative pressures of 60–160 cm. of water. Eventually, by increasing the milk flow still further, a point was reached when the infant ceased to suck. The pressures attained were independent of the age or size of the infants; the highest negative pressure recorded was 250 cm. of water in an infant 9 weeks old and using a teat with a very low flow.

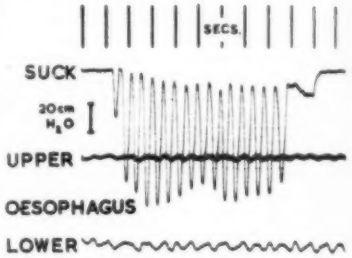

FIG. 2.—Recording from mouth (upper trace) and oesophagus during a burst of sucking at a low-flow teat. Note the uninterrupted intrathoracic respiratory pressure swing recorded from the oesophagus.

Sucking was usually regular and completely independent of respiration. When the milk flows were moderate the rate of sucking varied from 50 to 70 a minute, and was usually maintained at a constant rate and amplitude throughout the feed. With low milk flows sucking usually occurred in bursts of 10 to 15 sucks with fast sucking rates up to 130 a minute. The duration of each negative-pressure swing varied with the rate; at high sucking rates the duration was between 0.3 and 0.5 second, while with lower sucking rates the duration was up to 0.7 second. In most instances the pressure in the mouth returned to the baseline after each suck (Fig. 2), but in some infants a negative level was sustained between sucks (Fig. 3). This varied from 20 to 60 cm. of water.

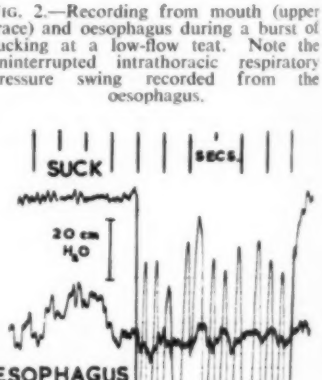

FIG. 3.—Recording from mouth (upper trace) and oesophagus during a burst of sucking. Note that in this instance the pressure did not return to the baseline between each suck.

The area in which these negative pressures were present was mapped out by withdrawing a recording tube at 0.25-cm. intervals from the pharynx back into the teat. In nine infants in whom this was done the negative pressures were present only within a distance of 1 cm. distal to the tip of the teat as it lay naturally in the mouth. By withdrawing a tube along the outside of the teat the area of negative pressure was demonstrated up to the waist of the teat.

Pressures measured immediately within the tip of the teat showed a regular small swing. Each suck is preceded by a biting movement of the jaws, and this is associated with a small rise in pressure within the teat of 5 to 7 cm. of water. Following this there is a small fall in pressure of 5 to 7 cm. of water during the suck.

Swallowing

Pharynx.—Swallowing produced a brief rise in pressure that travelled swiftly through the pharynx in a peristaltic manner (Fig. 4). The pressure rises varied from 30 to 100 cm. of water.

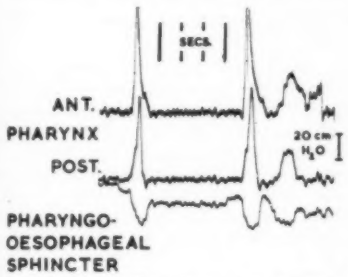

FIG. 4.—Recording from the pharynx (upper two traces) and pharyngo-oesophageal sphincter during two swallows.

Pharyngo-oesophageal Junction.—Between the oesophagus and the pharynx an area of increased resting pressure was demonstrated, indicating tonic contraction of the upper oesophageal sphincter. The average pressure was 40 cm. of water above intra-oesophageal pressure and the area was 0.5 to 1 cm. in length. On swallowing, the pressure in this area fell briefly to the oesophageal level (Figs. 4 and 5). The rate of swallowing increased with the milk flow, and repetitive swallows up to 30 a minute, each with an individual fall in pressure in this area, were recorded (Fig. 6). In one child, using a high milk flow, the pressure in this area fell, and was maintained at a low level for several seconds without discrete swallows.

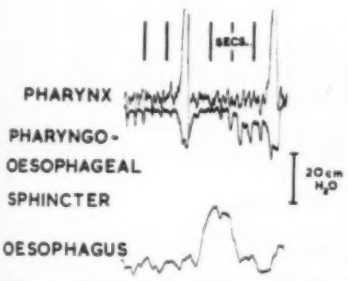

FIG. 5.—Recording from the pharynx, pharyngo-oesophageal sphincter, and oesophagus. Note the sequence of pharyngeal contraction, relaxation of the sphincter, and oesophageal peristaltic wave.

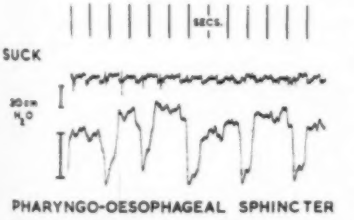

FIG. 6.—Recording from the mouth and pharyngo-oesophageal sphincter using a high milk flow. Note the absence of sucking and the repetitive relaxations of the sphincter.

Oesophagus.—When swallowing was infrequent a peristaltic wave was observed throughout the oesophagus following each act of deglutition. This was recorded as a simple rise of pressure of 20 to 40 cm. of water pressure lasting 2 to 4 seconds (Figs. 5 and 7). The rate of progression of the wave was 0.7 to 4 cm. per second, being swifter in the lower half of the oesophagus than the upper half. With repetitive swallowing a wave was recorded for only a few centimetres below the pharyngo-oesophageal sphincter and was absent throughout the rest of the oesophagus.

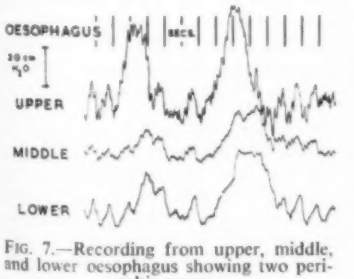

FIG. 7.—Recording from upper, middle, and lower oesophagus showing two peristaltic waves.

Gastro-oesophageal Junction.—This appeared to be an extremely localized area. Detailed observations were technically impossible, as the infants did not cease from swallowing long enough to permit recordings of resting pressure. The point of reversal of the respiratory pressure swing from an intra-abdominal to an intrathoracic pattern could be recognized. The peristaltic wave in this area differed from the oesophageal form in being prolonged, and lasted up to 10 seconds. If a second swallow was initiated while this prolonged pressure rise was present the pressure at once fell to the previous level.

Discussion

The present observations leave no doubt that infants can suck vigorously and that this is intensified as milk becomes harder to obtain. By contrast, the pressure changes within the teat are trivial, and this suggests that, in these experiments, squeezing the teat by the jaws and tongue played little part in extracting milk. However, the physical conditions in using a double-ended bottle may be different from a single-ended one, while breast-feeding is further complicated by additional factors, including the "draught" reflex. Therefore the present findings cannot be assumed to hold good in all conditions.

Ardran *et al.* (1958), in a cineradiographic study of bottle feeding, described the movements of the jaws and tongue. Initially the jaws move together, gripping the teat, while the tongue begins to indent the inferior aspect of the teat. The tongue then moves backwards so that the outline of the teat is flattened, and during this time milk passes into the mouth. These appearances were interpreted as a squeezing process expressing milk from the teat. Our observations do not support this, but combined pressure and cineradiographic observations would be necessary to define this point. The backward movement of the tongue within the mouth is most probably the method of producing the negative sucking pressures, similar to withdrawing a piston in an airtight syringe.

The pressures obtained during swallowing show an identical pattern to those recorded in adults. In particular the magnitude and timing of the pressure changes correspond almost exactly to the adult data. The technique is simple and well tolerated, and should prove useful in investigating difficulty in feeding and swallowing in this age group.

Summary

Pressures in the mouth, pharynx, and oesophagus have been measured in 14 infants during bottle-feeding. Sucking is accompanied by marked negative pressures in the mouth, while pressure changes within the teat are small. This has been interpreted that sucking, rather than squeezing the teat, is the more important action in obtaining milk. The pressures recorded during swallowing show an identical pattern in the pharynx, oesophagus, and junctional areas to that recorded in adults.

We are grateful to Dr. J. Forest Smith and Dr. B. D. R. Wilson for allowing us to examine infants under their care.

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INFLUENCE OF INTRA-ARTERIAL HYDROCORTISONE ON ADRENERGIC RESPONSES IN THE HAND

BY

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The profound influence exerted by the adrenal cortex on vascular activity has been abundantly demonstrated in laboratory animals, and there are good clinical grounds for inferring a similar relationship in man. In hypertensive patients who subsequently develop Addison's disease or who are treated by bilateral adrenalectomy a fall in blood pressure has been noted (Perera, 1945; Thorn *et al.*, 1952; Arnott *et al.*, 1957). When such patients are given an excess of deoxycortone or cortisone the blood pressure may rise even to hypertensive levels (Loeb *et al.*, 1939; Thorn *et al.*, 1942; Roth *et al.*, 1943). After total adrenalectomy the circulatory responses to adrenaline and noradrenaline are severely impaired, both in the experimental animal (Ramey *et al.*, 1951) and in man (Howland *et al.*, 1956), but these deficiencies may be corrected by the administration of cortisone. In the present investigation the influence of hydrocortisone on peripheral adrenergic activity has been studied in healthy adults; constrictor responses in the hand to adrenaline and noradrenaline were measured before and immediately after an intra-arterial infusion of hydrocortisone.

Subjects and Methods

Repeated tests were performed on 22 healthy young adults—medical students and colleagues—between the ages of 18 and 28, all but two of whom (I.D. and E.P.) were men.

Throughout every experiment the subject rested on a couch in a laboratory kept at 23±1° C., while the blood flow in both hands was measured by venous occlusion plethysmography every half-minute under standard conditions (Duff, 1952).

Through a needle inserted under local analgesia into the brachial artery, saline (0.9% w./v. NaCl) was infused continuously at the rate of 3 ml./min. The hand receiving this infusion (usually the right) was designated the "test" hand, the opposite (left) being the "control" hand. At regular four-minute intervals plain saline was alternated with saline solutions of known concentrations of various hormones. In the first half of each experiment the effects of successive infusions of adrenaline and noradrenaline at dose levels of 1/16 and 1/8 μg./min. were measured, each hormone infusion being preceded by a four-minute infusion of plain saline. Next, hydrocortisone was given by the intra-arterial infusion, in most experiments at the rate of 100 μg./min. for six minutes, and in the remainder at 15, 50, or 200 μg./min. for four or six minutes. The total amounts given were between 60 and 1,200 μg. In the second half of each experiment the various doses of adrenaline and noradrenaline were given in the same concentrations as before. The order in which these hormones were infused was varied in some experiments and kept constant in others; the results did not appear to be influenced by the sequence in which the infusions were given.

Synthetic L-adrenaline bitartrate (B.D.H.) and synthetic L-noradrenaline bitartrate (Bayer) were diluted with physiological saline (0.9% w./v. NaCl) solution, to which ascorbic acid had been added (1 mg./litre saline) to prevent oxidation (Gaddum *et al.*, 1949). In different tests two preparations of hydrocortisone were used—water-soluble hydrocortisone free alcohol in glycols (Roussel Laboratories) and a free alcohol 50% ethanol preparation (Boots). The activity of each excipient solvent was also tested in a series of control experiments.

The mean change in flow in the test hand during each individual infusion of adrenaline, noradrenaline, or hydrocortisone was estimated from the measurements of blood flow during the control and experimental periods. The results were analysed by a method that made due allowance both for incidental fluctuations in the circulation through the control hand and for bilateral changes in flow unrelated to the test infusions (Duff, 1955a). The results obtained in a typical experiment are illustrated in Fig. 1.

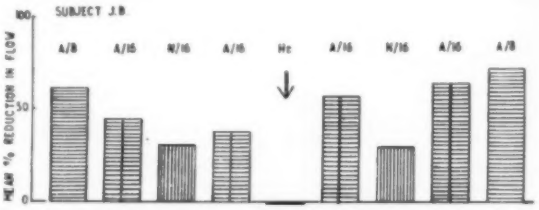

FIG. 1.—Constrictor effects of adrenaline (A/16, A/8) and noradrenaline (N/16) infusions before and after the intra-arterial infusion of 400 μg. of hydrocortisone (Hc).

Results

Effects of intra-arterial adrenaline before and after intra-arterial hydrocortisone

(a) *Adrenaline 1/16 μg./min.*—The initial infusion of this concentration of adrenaline generally caused a slight reduction in flow in the test hand during most of the four-minute infusion period. The flow in the other hand usually stayed around the same average level as that during the previous saline control period, but sometimes changed in a haphazard manner unrelated to the level in the test hand. The results of 16 experiments were analysed to reveal the independent change in flow in the test hands attributable to the adrenaline (Table I, a). The mean effect was a reduction of flow of 29%. After hydrocortisone had been infused into the artery the second infusion of adrenaline (1/16 μg./min.) caused an independent reduction of flow in the test hand which was usually greater than before, averaging 41% (Table I, a). The difference between these values is significant ($t=2.9$, $P<0.02$).

(b) *Adrenaline 1/8 μg./min.*—With the higher dose of adrenaline the first infusion usually caused a greater reduction in flow, which in 14 experiments averaged 36%. After the hydrocortisone had been given this dose of adrenaline now caused an even greater reduction in flow, averaging 52% (Table I, b). Here again the difference between the two values (36% and 52%) is significant ($t=4.5$, $P<0.001$).

Thus after the hydrocortisone had been infused the vasoconstriction to adrenaline was significantly greater at both dose levels.

Effects of intra-arterial noradrenaline before and after intra-arterial hydrocortisone

(a) *Noradrenaline 1/16 μg./min.*—In 15 experiments the flow was reduced during the first infusions by an average amount of 26% (Table II, a). After the hydrocortisone infusions the noradrenaline was found to cause a fall averaging 29%. These values do not differ significantly ($t=0.6$, $P=0.5$).

(b) *Noradrenaline 1/8 µg./min.*—The initial infusion of this concentration of noradrenaline was associated with a reduction in flow which in 13 experiments averaged 29%. The reduction of flow in the test hands of these subjects after the hydrocortisone average 36% (Table II, b). These means do not differ significantly (t = 1.1, P = 0.3). There was thus no consistent or significant change in the response to noradrenaline of hands previously infused with hydrocortisone.

Effect of intra-arterial hydrocortisone on the resting level of flow in the infused hand

An estimate of the net effect of hydrocortisone on the calibre of the arterioles in the infused hands was obtained by comparing the levels of flow before and immediately after each hydrocortisone infusion. In six experiments the mean flow in the test hands was 6.6 ml./100 ml./min. before and 5.9 ml. after hydrocortisone had been infused in a

TABLE I.—*Effects of Intra-arterial Adrenaline (a) 1/16 µg./min., and (b) 1/8 µg./min., Before and After Hydrocortisone*

Subject	Before Hydrocortisone							After Hydrocortisone						
	A	a	B	b	E	B–E	B–E/E%	A	a	B	b	E	B–E	B–E/E%
(a) *Adrenaline 1/16 µg./min.*														
E.P.	1·9	2·1	1·3	2·4	2·2	−0·9	−41	2·8	3·2	1·0	2·6	2·3	−1·3	−57
E.H.	15·8	17·4	6·1	11·7	10·6	−4·5	−42	11·7	7·9	8·6	9·1	13·5	−4·9	−36
C.H.	7·0	4·2	6·0	4·7	7·8	−1·8	−23	13·2	5·1	6·9	3·4	8·8	−1·9	−22
M.M.	15·6	19·7	14·2	19·7	15·6	−1·4	−09	11·9	11·3	9·5	19·5	20·5	−11·0	−54
J.B.	12·9	16·1	4·3	9·6	7·7	−3·4	−44	6·0	6·7	5·6	14·2	12·7	−7·1	−56
J.B.	9·1	12·0	5·1	10·7	8·1	−3·0	−37	6·8	7·7	3·5	10·6	9·4	−5·9	−63
I.D.	4·8	15·9	2·6	12·4	3·7	−1·1	−30	9·1	13·6	3·6	7·9	5·3	−1·7	−32
J.P.	8·8	15·9	7·1	16·0	8·8	−1·7	−13	3·3	5·2	1·9	5·8	3·7	−1·8	−49
U.C.	18·2	16·5	15·8	17·8	19·6	−3·8	−19	17·3	12·5	9·8	10·4	14·3	−4·5	−31
C.A.	14·3	15·9	12·0	15·6	14·0	−2·0	−14	19·2	20·8	12·1	18·7	17·3	−5·2	−30
M.M.	13·2	7·7	6·6	5·6	9·6	−3·0	−31	14·8	7·5	8·5	7·8	15·4	−6·9	−45
N.G.	7·2	6·7	3·8	4·4	4·7	−0·9	−19	6·3	6·3	4·4	4·7	4·7	−0·3	−06
J.C.	18·0	16·8	12·2	13·8	14·7	−2·5	−17	18·3	20·3	12·4	18·3	16·5	−4·1	−25
R.H.	5·6	7·1	3·4	6·9	5·4	−2·0	−37	3·9	6·8	1·5	6·8	3·9	−2·4	−62
T.P.	9·7	6·1	5·1	5·6	8·9	−3·8	−43	9·6	5·5	3·8	2·9	5·1	−1·3	−25
J.D.	16·7	8·3	9·0	7·2	14·5	−5·5	−38	18·8	12·4	4·7	8·5	12·9	−8·2	−64
Average							−29							−41
(b) *Adrenaline 1/8 µg./min.*														
C.A.	8·6	11·9	4·9	9·2	6·6	−1·7	−26	7·6	13·3	5·8	13·2	7·5	−1·7	−27
D.B.	7·6	9·9	6·6	9·1	7·0	−0·4	−06	7·1	16·2	4·7	10·9	6·1	−1·4	−23
B.B.	4·0	1·9	1·9	1·8	3·8	−1·9	−50	4·5	1·7	1·3	2·2	5·8	−4·5	−78
E.P.	2·2	1·6	1·1	1·6	2·2	−1·1	−50	2·9	3·7	1·3	5·1	4·0	−2·7	−68
T.F.	7·1	7·6	8·7	8·9	8·3	0·4	05	13·8	10·6	6·7	7·1	9·2	−2·5	−27
F.P.	7·3	5·2	2·2	6·4	9·0	−6·8	−76	8·4	9·3	2·5	13·7	12·4	−9·9	−80
G.M.	7·5	11·2	8·9	18·6	12·5	−3·6	−29	15·2	26·7	5·7	23·9	13·6	−7·9	−58
D.E.	44·9	31·0	41·5	31·2	45·2	−3·9	−09	36·7	21·6	23·2	21·3	36·2	−13·0	−36
J.C.	7·5	16·8	4·5	14·3	6·3	−1·8	−29	9·3	12·9	3·4	12·3	8·9	−5·5	−62
E.H.	9·1	11·5	5·3	11·9	9·4	−4·1	−44	15·7	15·1	11·0	20·1	20·9	−9·9	−47
M.M.	14·1	19·2	10·6	16·8	12·0	−1·4	−12	12·7	14·4	7·4	13·0	11·5	−4·1	−36
J.B.	9·6	14·2	4·2	16·3	11·0	−6·8	−61	9·2	11·7	3·5	15·3	12·0	−8·5	−71
J.C.	21·5	18·1	6·8	14·5	17·2	−10·4	−60	16·4	16·2	8·1	21·5	21·8	−13·7	−63
R.C.	23·5	20·6	12·5	22·6	25·8	−13·3	−52	23·8	23·5	13·6	25·4	25·7	−12·1	−47
Average							−36							−52

A, a = mean blood flow in test and control hands, respectively, during saline infusion period; B, b = corresponding means during succeeding adrenaline infusion period; E = A/a; B–E/E% = mean percentage change in flow due to adrenaline.

TABLE II.—*Effects of Intra-arterial Noradrenaline (a) 1/16 µg./min. and (b) 1/8 µg./min.*

Subject	Before Hydrocortisone							After Hydrocortisone						
	A	a	B	b	E	B–E	B–E/E%	A	a	B	b	E	B–E	B–E/E%
(a) *Noradrenaline 1/16 µg./min.*														
E.H.	17·4	18·2	15·1	17·6	16·8	−1·7	−10	13·8	12·3	5·9	12·5	14·0	−8·1	−58
C.H.	4·9	4·6	4·6	5·6	6·0	−1·4	−23	9·8	4·9	13·7	6·1	12·2	1·5	12
M.M.	15·9	21·2	15·6	20·9	15·6	0·1	01	17·9	18·6	11·1	15·2	14·6	−3·5	−24
J.B.	11·0	13·1	7·3	12·4	10·4	−3·1	−30	9·3	12·2	5·2	9·6	7·3	−2·1	−29
I.D.	4·9	16·6	4·4	12·1	3·6	0·8	22	7·6	7·9	6·1	6·4	6·2	−0·1	−02
J.P.	6·8	9·0	2·7	6·2	4·7	−2·0	−43	5·8	8·1	3·0	7·7	5·5	−2·5	−45
U.C.	13·0	8·1	11·2	8·5	13·6	−2·4	−18	12·6	9·1	12·1	10·0	13·8	−1·7	−12
C.A.	17·7	15·5	16·0	19·2	21·9	−5·9	−27	19·8	18·9	14·6	16·8	17·6	−3·9	−17
M.M.	14·0	6·6	13·9	9·0	19·1	−5·2	−27	17·2	11·5	11·8	6·5	9·7	−2·1	−22
N.G.	8·2	7·4	4·7	7·6	8·4	−3·7	−44	6·4	4·8	3·9	3·8	5·1	−1·2	−24
F.P.	8·2	8·7	5·1	9·6	9·0	−3·9	−43	9·2	7·4	4·5	7·1	8·8	−4·3	−49
R.C.	14·3	13·0	8·7	15·2	16·7	−8·0	−48	18·9	22·6	7·6	17·3	14·5	−6·9	−48
J.C.	16·3	22·0	11·6	17·4	12·9	−1·3	−10	19·9	11·3	11·0	11·0	19·4	−8·4	−43
T.P.	13·2	5·8	3·6	3·2	7·3	−3·7	−51	12·7	4·4	7·6	5·3	15·3	−7·7	−50
J.D.	16·9	6·6	11·3	7·2	18·4	−7·1	−39	13·7	8·0	12·1	9·6	16·4	−4·3	−26
Average							−26							−29
(b) *Noradrenaline 1/8 µg./min.*														
C.A.	9·1	8·7	4·9	7·7	8·1	−3·2	−40	5·6	6·9	4·1	7·6	6·2	−2·1	−34
D.B.	6·2	8·6	5·1	8·7	6·3	−1·2	−19	6·3	13·7	5·9	12·4	5·7	0·2	04
B.B.	4·0	1·9	1·4	2·2	4·6	−3·2	−70	4·1	2·5	1·8	3·9	6·4	−4·6	−72
E.P.	1·9	2·1	1·3	1·8	1·6	−0·3	−19	2·9	3·1	0·7	3·1	2·9	−2·2	−76
T.F.	10·2	7·4	10·1	8·6	11·9	−1·8	−15	12·7	11·6	8·4	9·8	10·7	−2·3	−21
F.P.	10·8	8·9	4·1	8·9	10·8	−6·7	−62	10·5	11·2	5·1	10·1	9·5	−4·4	−46
G.M.	12·1	15·3	8·3	16·7	13·2	−4·9	−37	12·6	21·7	8·4	21·2	12·3	−3·9	−32
D.E.	37·9	26·3	35·2	24·4	35·2	0	0	30·9	23·9	23·4	16·3	21·1	2·3	11
J.C.	6·9	17·8	9·1	20·2	7·8	1·3	17	10·6	16·3	5·2	13·9	9·0	−3·8	−42
E.H.	15·8	15·9	8·3	14·9	14·8	−6·5	−44	11·7	11·2	10·8	18·3	19·1	−8·3	−43
R.C.	19·0	15·7	10·3	16·2	19·6	−9·3	−47	34·8	23·0	17·2	24·8	37·5	−20·3	−54
T.P.	15·7	15·0	12·1	15·3	16·0	−3·9	−24	16·6	12·0	7·1	10·7	14·8	−7·7	−52
J.E.	15·9	16·3	9·9	13·1	12·8	−2·9	−23	12·3	15·9	15·9	23·8	18·4	−2·5	−14
Average							−29							−36

A, a = mean blood flow in test and control hands, respectively, during saline infusion period; B, b = corresponding means during succeeding noradrenaline infusion period; E = A/a; B–E/E% = mean percentage change in flow due to noradrenaline.

concentration of 50 μg./min. Similarly, using 100 μg./min. hydrocortisone the mean blood flow levels were 12.4 ml. and 13.1 ml. respectively in 37 experiments, and with 200 μg./min. the mean levels were 17.8 ml. and 16.6 ml. in 10 experiments. Thus, clearly, hydrocortisone itself (in concentrations between 50 and 200 μg./min.) does not cause any notable change in the level of flow through the arterioles into which it is infused.

Effect of hydrocortisone-free excipient on responses to adrenaline and noradrenaline

Ten experiments were performed, using a procedure identical to that adopted in the tests in which hydrocortisone was given at dose rates of 100 and 200 μg./min., except that the excipient solution alone was used, the hydrocortisone itself being omitted. Adrenaline and noradrenaline infusions were given before and after the solvent had been infused into the brachial artery. The dose of each hormone was 1/16 μg./min. In 23 paired tests with adrenaline the mean effects were a 28% reduction in flow before, and 25% after, the hydrocortisone-free solvent; these values clearly do not differ appreciably. In 10 tests with noradrenaline the corresponding values were 21% and 26%, which also do not differ significantly.

Discussion

These experiments show (Fig. 2) that in the hands of healthy subjects the average constrictor effect of intra-arterial adrenaline was enhanced by infusing hydrocortisone

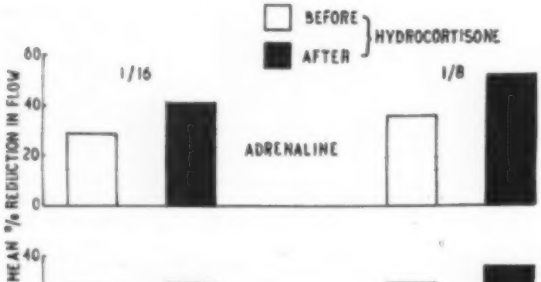

FIG. 2.—Mean constrictor effects in 22 subjects of adrenaline and of noradrenaline (1/16 and 1/8 μg./min.) before and after hydrocortisone intra-arterially.

into the brachial artery. The absence of any change in the control experiments, using the solvent present in ampoules issued commercially, indicates that the observed effects were not due to the material in which hydrocortisone is dissolved. It is therefore reasonable to attribute the increased response to the hydrocortisone itself.

The increased constrictor response was evident within a few minutes of completing the infusion of hydrocortisone. This effect must have been due to a purely peripheral action of the steroid, for the mode of administration and method of analysis excluded the influence of systemic factors and of changes in sympathetic activity. The arterioles have thus been "sensitized" to the direct action of adrenaline, and, since this "hypersensitivity" was not associated with any change in the resting level of hand flow, it is unlikely that some physical change such as swelling of the arteriolar walls was responsible. This interpretation is supported by the fact that the hydrocortisone was not usually followed by an increase in the constrictor response of these same vessels to noradrenaline.

The pattern of response to the adrenergic hormones after intra-arterial hydrocortisone, when there is a more powerful constriction with adrenaline than with noradrenaline, contrasts with that usually found in healthy subjects. But in untreated hypertensive patients studied under identical experimental conditions it was found previously that the constrictor responses of the hands to adrenaline tended on the whole to be greater than normal (Duff, 1957a). No such striking difference with regard to *noradrenaline* was revealed as between subjects with normal and raised blood pressures (Duff, 1955b, 1957b). Thus the selective enhancement of the arteriolar response to adrenaline after the introduction of hydrocortisone into the brachial artery of healthy subjects closely resembles that observed in the hands of patients with untreated essential hypertension.

Although hydrocortisone has been identified as a normal product of the human adrenal cortex, and although there is good evidence that the output of this hormone may be raised after the administration of corticotrophin (Nelson *et al.*, 1951; Sweat, 1955) and in Cushing's syndrome (Eik-Nes *et al.*, 1955; Sweat, 1955) it is within normal limits in essential hypertension (Eik-Nes *et al.*, 1955). There is indeed no direct evidence that hydrocortisone itself is involved in hypertension. However, the possibility that in hypertensive subjects there may be an alteration in vascular function similar to that observed after hydrocortisone in the present study, consequent upon some imbalance of adrenal cortical secretion, perhaps deserves further investigation.

Although the present investigation revealed no consistent enhancement of the response to *noradrenaline* in vessels of the hand (Fig. 2), pressor responses to this hormone are definitely potentiated by systemic cortisone in both animals and men (Kurland and Freedberg, 1951; Ramey *et al.*, 1951; Howland *et al.*, 1956). The latter effect must therefore be attributed to actions on vascular beds other than those of the skin, and it is interesting that topical applications of cortical extracts increase the constriction produced by noradrenaline in the meso-appendix of the adrenalectomized rat (Fritz and Levine, 1951). Further investigation might therefore be directed to an examination of the influence of hydrocortisone and other adrenal corticoids on the actions of both adrenaline and noradrenaline in vascular beds apart from those of the skin.

Summary

The effects of intra-arterial hydrocortisone on the constrictor responses of vessels of the hand to intra-arterial adrenaline and to noradrenaline have been measured in 22 healthy adults by a plethysmographic method.

Hydrocortisone itself, in amounts totalling between 0.6 and 1.2 mg., caused no appreciable change in the level of blood flow in the hand.

After infusing hydrocortisone there was usually an increase in the vasoconstriction produced by given amounts (0.25 and 0.5 μg.) of adrenaline; but the response to noradrenaline was not greatly altered.

This selective change in vascular response produced by hydrocortisone is shown to resemble the vascular hypersensitivity found in some untreated hypertensive patients.

Some implications of these findings are discussed.

We are indebted to Professor Henry Barcroft and Dr. Geoffrey Bourne for encouragement and advice; to colleagues and students for generously volunteering for the experiments; and to Miss Robina Palmer, Miss Mary Sanders, and Miss Mary Bedford for valuable technical assistance, at St. Thomas's and St. Bartholomew's Hospitals respectively. Messrs. Roussel and Messrs. Boots Ltd. kindly supplied hydrocortisone and excipient solutions, and secretarial help was given by Mrs. Roddis and Mrs. S. Bradford, of the Department of Medicine, Royal Hospital, Sheffield.

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METHOD OF REDUCING FRACTURE-DISLOCATION OF HIP-JOINT WITH FRACTURED FEMUR ON SAME SIDE

BY

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A fracture of the shaft of the femur complicating a dislocation of the hip on the same side makes the task of reducing the dislocation extremely difficult. Two such cases are described of severe multiple injuries to a lower limb each complicated by a posterior dislocation of the hip in which the dislocation was reduced by a method based on that described by Ingram and Turner (1954).

The method consists in transfixing the greater trochanter of the femur percutaneously in an antero-posterior direction with a stout Steinmann pin. On to each projecting end of the pin is clamped a Mole self-grip wrench of the type used by mechanics and commonly known as the "third hand." This wrench grips the pin more efficiently than any surgical instrument, and, once clamped tight, it does not slip or rotate. With one assistant controlling the fractured femur and another steadying the pelvis, the operator holds the wrench in either hand and exerts traction on the proximal fragments of the femur in a position of flexion and abduction until reduction is accomplished. Strong traction may have to be sustained for a few minutes. After reduction has been performed the pin is withdrawn.

In the first case described here the method was employed after exposing the hip-joint, while in the second case a closed reduction was used successfully.

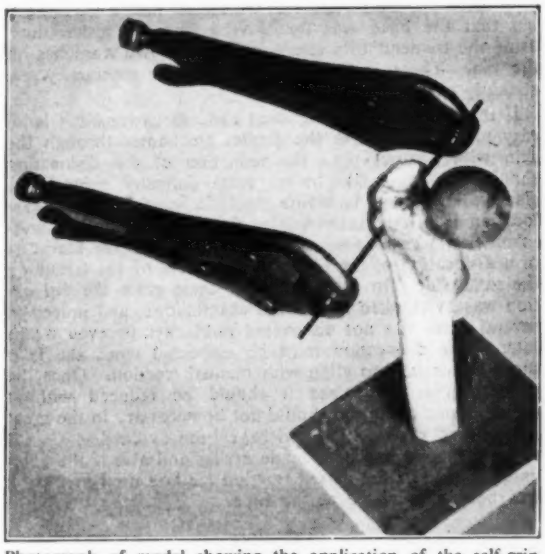
Case 1

A man of 25 sustained severe multiple injuries to his left leg in a motor-cycle accident. The foot and ankle were so badly damaged that a below-knee amputation was carried out after initial resuscitation with blood transfusions. Radiographs showed a comminuted supracondylar fracture of the left femur. The hip region was not radiographed initially. When attempts to reduce the supracondylar fracture failed to align the fragments a posterior dislocation of the hip-joint was suspected. The proximal fragment of the femur was fixed in flexion, abduction, and internal rotation. The dislocation defied all attempts at reduction and manipulation. The patient's condition at this stage did not warrant an open reduction being performed, and he was returned to bed with the limb on a Thomas splint with skeletal traction through the tibial tubercle. Radiographs taken next day showed a posterior dislocation of the left hip.

For the next few days his condition gave rise to anxiety in spite of further blood transfusions, but at the end of a week he had recovered sufficiently for an open reduction of the dislocation to be attempted.

Operation.—The left hip was exposed by a postero-lateral incision, and the head of the femur was found lying on the back of the ilium with no sign of an investing capsule. The posterior margin of the acetabulum had been split off into two separate fragments. Attempts were made to reduce the dislocation, but in spite of using all the available instruments the head could not be made to budge. A pair of self-grip wrenches were borrowed from the hospital engineer, cleansed, and sterilized. The greater trochanter was transfixed with a Steinmann pin and the wrenches were clamped on to the pin on each side of the bone. By grasping the wrenches the femur could then be lifted up and forward until the dislocation was reduced with surprising ease. The posterior acetabular margin was replaced and held in position with two screws. The fractured femur was then realigned and placed on the Thomas splint.

Twelve weeks after this operation the fractured femur had united and the patient was discharged from hospital, walking with crutches. He had regained an excellent range of movement of both hip- and knee-joints. Three months later he was walking about with his artificial limb.



Photograph of model showing the application of the self-grip wrenches.

Case 2

A youth of 18 was admitted to hospital in a shocked state with severe multiple injuries to his left lower limb. There was a compound fracture of the big toe, a double fracture of the tibia, and a supracondylar fracture of the femur. In addition to these injuries there was a posterior dislocation of the hip-joint which on this occasion was recognized initially when attempts made to straighten the femur had failed to correct the angulation. Closed manipulation of the dislocation was unsuccessful and a Steinmann pin was then inserted through the skin, transfixing the greater trochanter. The self-grip wrenches were again borrowed and brought into use as previously described. With this method the dislocation was reduced with an audible snap. The pin was withdrawn and the other injuries to the left leg were then treated. Two Steinmann pins were driven across the upper and lower ends of the

tibia, the tibial fractures were manipulated, and a below-knee padded plaster cast was applied, incorporating the pins. The limb was then laid on a Thomas splint, the femoral fragments were aligned, and skeletal traction was applied through the pin in the upper tibia.

The patient's subsequent progress was very satisfactory. All his fractures united, and six months later he returned to work as a sanitary inspector. His only complaint was some slight stiffness around the ankle-joint at the start of the day. He walked unaided without a limp.

Discussion

Closed manipulative reduction of a posterior dislocation of the hip is as a rule unsuccessful when there is a fracture of the same femur. Where the femur is fractured in its proximal half it has been advised to perform an intramedullary fixation of the femur and then to reduce the dislocation in the usual manner once the long lever of the shaft has been restored. Watson-Jones (1955) quotes a case thus treated. In the two cases reported above the fractured femur was in the supracondylar area and therefore unsuitable for internal fixation. One is then left with the alternative of trying to reduce the dislocation by closed skeletal traction on the proximal femoral fragment or to perform an open reduction.

Open reduction in these cases may be more difficult than it would appear to be. Dehne and Immerman (1951) report an unsuccessful attempt in which lion-jawed forceps were applied to the exposed proximal fragment of the femur for traction and manipulation. In Case 1 it was only after the trochanter was transfixed with a Steinmann pin that the head was manœuvred into the acetabulum, using the tremendously strong grip of the two wrenches on the pin. These instruments brought into emergency use certainly saved that situation.

If the dislocation is diagnosed early in treatment it is an easy matter to transfix the greater trochanter through the skin with a stout pin; the reduction of the dislocation should then give rise to no great difficulty using these clamps. However, in severe multiple injuries the hip dislocation is often overlooked at first. Dehne and Immermann (1951) have found a total of 42 cases in the literature of a dislocation of the hip with a fracture of the femur on the same side. In exactly half of these cases the dislocation was overlooked at the first examination, and indeed in several cases was not discovered until days or even weeks later. The dislocation must be suspected when the fractured femur fails to align with manual traction. Once the dislocation is recognized it should be reduced without delay. Open operation should not be necessary in the great majority of cases and would have been avoided in Case 1 if the diagnosis had been made earlier and also if the comparative ease of the closed traction method used in Case 2 had been appreciated at the time.

Summary

Two cases are described of multiple injuries to one lower limb complicated by a posterior dislocation of the hip-joint.

A method of skeletal traction is described whereby the dislocations were reduced.

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The World Health Organization is supplying 25,000 doses of cholera vaccine to help immunize the population of Nepal. A large epidemic of cholera has broken out in Khatmandu, the first to be reported from Nepal since the beginning of the century. W.H.O. emphasizes that the cholera situation is serious in Asia. Cases and deaths are twice as numerous as last year in India and Pakistan, and an epidemic has struck Thailand for the first time for many years.

FRAMYCETIN SULPHATE: A CUTANEOUS ANTIBIOTIC

BY

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Although inquiry from general practitioners confirms that pyogenic skin infections are still prevalent in the population as a whole, the number of such cases coming to hospital for treatment has shown a steady decline within the past few years (Hall and Burrows, 1957). This is largely due to the satisfactory response to the surface application of antibiotics. As Church (1954) has pointed out, a satisfactory antibiotic for this purpose is one which is not used systemically, which causes little cutaneous reaction, and which has a low incidence of bacterial resistance. It was therefore thought worthwhile to study the properties of framycetin sulphate ("soframycin") in relation to these criteria.

This drug was first described by Decaris (1953). It has toxic properties when administered systemically, and therefore is reserved exclusively for local use. Published reports in the French literature indicate that it satisfies the other requirements, but as no investigation appears to have been carried out in this country it was decided to test its efficiency in suitable cases.

Framycetin sulphate is produced by a strain of *Streptomyces decaris*. It is a white odourless powder, soluble in water, and the free base is alkaline (Janot *et al.*, 1954).

Investigation

Framycetin sulphate (kindly supplied by Roussel Laboratories Ltd.) was made up in 1.5% in a water-soluble ointment base. Patients were told to apply the ointment three or four times a day, removing crusts with a 1% solution of cetrimide, and where necessary, as with infections of the beard and impetigo of the face, applying the ointment into the nostril (Gould and Cruikshank, 1957).

Fifty cases were treated, and bacterial examination was carried out on material from each case. The organisms were tested *in vitro* on blood-agar for sensitivity to penicillin, chlortetracycline, and framycetin sulphate (Table I). The concentrations of antibiotics used were: penicillin 5 units/ml., chlortetracycline 0.1%, framycetin sulphate 0.1%.

The 50 cases were made up as follows: impetigo, 32; infective dermatitis, 9; secondarily infected eczema, 4; infected papular urticaria, 2; folliculitis, 2; and sycosis barbae, 1. Only two cases—one of impetigo and one of infective dermatitis—failed to respond. Twenty-two (69%) of the cases of impetigo were cured within one week.

Organisms

1. *Staphylococcus aureus haemolyticus* only was found in 14 cases of impetigo, 2 cases each of folliculitis, infected papular urticaria, infective dermatitis, and secondarily in-

TABLE I.—*Sensitivity of Staph. aureus haemolyticus and Str. haemolyticus*

	Penicillin		Chlortetra.		Framycetin	
	Res.	Sen.	Res.	Sen.	Res.	Sen.
1. *Staph. aureus haemolyticus* only	19	4	2	21	0	23
2. *Str. haemolyticus* only	0	6	0	6	5	1
3. Mixed Infection:						
Staph. aureus haemolyticus	5	3	2	6	0	8
Str. haemolyticus	1	7	0	8	5	3
4. Mixed Infection:						
Staph. aureus haemolyticus	1	4	0	5	0	5
Str. haemolyticus	0	5	0	5	4	1

fected eczema, and 1 case of sycosis barbae (Table I). The average time of cure in these cases was six days; some were cured in three days, the longest took 14 days.

2. *Streptococcus haemolyticus* only was found in six cases of impetigo (Table I). The average time of cure in these cases was 11 days. The shortest time of cure was seven days and the longest 21 days.

3. *Staph. aureus haemolyticus* and *Str. haemolyticus* were found in 3 cases of impetigo, 4 cases of infective dermatitis, and 1 case of secondarily infected eczema (Table I). The average time of cure in these cases was 11 days; the shortest time of cure was six days, and one case was not clear after three weeks' treatment.

4. *Staph. aureus haemolyticus, Staph. aureus,* and *Str. haemolyticus* were found in 4 cases of impetigo and 1 case of infective dermatitis. The average time of cure in these cases was eight and a half days; the shortest time of cure was four days; and the longest 15 days.

The other cases were made up as follows: Impetigo—*Staph. aureus haemolyticus* and *Str. viridans* (1 case); Infective dermatitis—*Staph. aureus haemolyticus* and *Staph. albus* (1 case); infective dermatitis—*Staph. albus* (1 case). No organisms were isolated in six cases of clinical impetigo. Table II shows the sensitivities of the organisms isolated.

TABLE II.—*Sensitivities of All Staph. aureus haemolyticus and Str. haemolyticus Organisms*

	Staph. aureus Haemolyticus		*Str. Haemolyticus*	
	Resistant	Sensitive	Resistant	Sensitive
Penicillin	27	11	1	18
Chlortetracycline	4	34	0	19
Framycetin	0	38	14	5

No undesirable reaction to the antibiotic was noted in the series, though this was carefully sought. The ointment has been used in over 100 patients without ill effect; many cases were statistically valueless because the patients failed to return for re-examination.

Discussion

The cure rate of 69% of cases of impetigo cleared within one week indicates that framycetin sulphate is an effective cutaneous antibiotic and compares favourably with neomycin; Church (1954) reported 60% cure in one week. It also compares favourably with chlortetracycline (Solomons, 1951), bacitracin (Miller *et al.*, 1949), and chloramphenicol (Newman and Feldman, 1951). However, general statements about its effectiveness must be guarded, because 65% of the streptococci isolated in this series were resistant, and it may be that its apparent effectiveness in this small series was due to the high proportion of cases from which the very sensitive *Staph. aureus haemolyticus* only was isolated. A 0.1% solution was used for *in vitro* testing, and a 1.5% concentration of antibiotic in water-soluble ointment is hardly ever likely to exceed 0.1% concentration in the tissues.

The *in vitro* findings appeared to be confirmed in three ways. (1) The two cases which framycetin sulphate failed to cure were both due to the haemolyticus type of streptococcus. (2) In one case of these—a case of clinical impetigo—a sensitive *Staph. aureus haemolyticus* was grown originally. As there was no response to treatment after one week, a further swab was taken, and this produced a pure growth of resistant haemolytic streptococcus. (3) The average time of cure of cases in which a haemolytic streptococcus was isolated, either in pure or in mixed growth, was twice that of those cases from which only *Staph. haemolyticus* was grown.

Summary

The results of treatment of 50 cases of skin infection with a new antibiotic—framycetin sulphate (soframycin) have been investigated.

Only two cases failed to respond to this antibiotic. Of the 32 cases of impetigo, 22 (69%) were cured within one week.

In 38 cases, all of which responded to the antibiotic, a *Staph. aureus haemolyticus* was isolated. In 19 cases *Str. haemolyticus* was isolated, and only five were sensitive to the antibiotic. The latter finding may reduce its effectiveness in general use, and clinical evidence is given to support this.

No example of contact sensitivity or irritation was noted in this series.

My thanks are due to Drs. McCaw, Hall, and Beare, for permission to study their cases and for their helpful advice. The Clinical Pathology Laboratory of the Royal Victoria Hospital was responsible for the bacteriology.

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Medical Memoranda

Management of Tetanus, using Chlorpromazine and Mephenesin

A 13-year-old boy was admitted to the Royal Victoria Infirmary on May 1, 1956, with moderately severe tetanus. Four days earlier he had developed a stiff neck. The next day trismus appeared, and during the 48 hours preceding admission he had increasing spasms of his back muscles and backache. There was no history of recent injury. He was a well-developed boy with severe trismus. Even when first seen he was having strong tetanic spasms at three- to four-minute intervals, but without cyanosis. There were dry superficial abrasions on his knee and wrist, but *Clostridium tetani* was not recovered from them.

MANAGEMENT

Sedation began with 50 mg. of chlorpromazine intramuscularly. There was a striking response, and within 20 minutes he was able to open his mouth. Mephenesin, 1 g., was then given orally. For the first 24 hours his spasms were well controlled with 50 mg. of chlorpromazine four-hourly and 1 g. of mephenesin three-hourly. During the second 24 hours he required larger doses of mephenesin, up to 1 g. hourly, with 25 mg. of chlorpromazine intramuscularly every four hours. On the third day the mephenesin was increased still further, and for the next nine days he was given a daily total of 36 g. of mephenesin by intragastric tube and 150 mg. of chlorpromazine intramuscularly (see Table). In addition 100,000 units of tetanus antitoxin

Amounts of Intramuscular Chlorpromazine and Oral or Intragastric Mephenesin Administered Daily

Day:	1	2	3	4	5	6	7	8	9	10	11	12
Chlorpromazine (mg.) ..	100	250	300	225	300	225	175	150	150	150	150	150
Mephenesin (g.)	3	16	20	32	33	34	32	33	36	36	36	—

had been given intravenously just before admission, and 120,000 units were given intramuscularly over the next two days. He was also given penicillin, but after five days this was changed to chlortetracycline because of developing consolidation in the left lung.

The pharynx and upper air passages were first kept clear by posture and aspiration, but on the third day, after a severe cyanotic attack, tracheotomy was carried out. (It

would have been wiser to do this on the second day.) Milk, with added dried milk, was given through the intragastric tube, and a daily intake of some 1,700 calories was maintained. There was a little loss of weight.

COMMENT

Mephenesin was used in this case for two main reasons. First, it is effective when given orally. But, because of its local anaesthetic action and the consequent very real danger of inhalation, it should be given in tablet form or by intragastric tube rather than as a mixture. Secondly, it acts on the spinal cord and not on the neuromuscular junctions, and therefore the danger of death from sudden respiratory arrest is negligible. Chlorpromazine has a variety of actions. The two called upon here were its excellent sedative qualities, which render the patient amnesic and drowsy without loss of consciousness, and its specific anticonvulsant action, which in this case greatly decreased the tetanic spasms within 20 minutes of the first injection.

With the method of treatment described here the child remained conscious, intravenous therapy was not required, and there was no real danger of death from sudden respiratory arrest. And, in spite of being drowsily aware of what was going on around him, the boy was not upset by the procedures, nor did he have unpleasant memories of what had been done. This treatment seems to merit a wider trial.

We thank Dr. Armstrong Davison, of the department of anaesthetics, who suggested this approach and helpfully supervised its application, and Mr. Munro Black, who carried out the tracheotomy and shared with Professor D. Court in the care of the child.

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A Paper Strip Test for Proteinuria

Recent laboratory trials of a simple paper strip test for proteinuria ("albustix") have been described (Baron and Newman, 1958; Frazer, 1958), and Carne (1958) has given his impression of the use of this diagnostic aid from the viewpoint of a general practitioner. Frazer, in particular, has commented upon its sensitivity and reproducibility, and upon the stability of the agent. The same preparation has been recently tested in various departments of a large teaching hospital, and the results are briefly reported here to indicate its considerable potentialities when applied as a routine clinical test for proteinuria.

The test consists in dipping impregnated paper strips into urine: the presence of protein causes a change of colour from yellow to a shade of green, the depth of which depends upon the concentration of protein. No difficulty has been experienced in demonstrating the technique of the test, and previously uninstructed nurses have been able to interpret the directions given on the bottle.

CLINICAL TRIAL

A total of 1,119 urines were tested by nursing staff or house-physicians in two medical wards, a general medical out-patient department, and a diabetic out-patient department. All urines were tested with albustix and with the sulpho-salicylic acid test for proteinuria (Harrison, 1957).

No attempt has been made in this study to indicate the depth of the colour reaction. The makers of albustix issue a colour scale with the preparation which purports to indicate the approximate protein content of the urine. Experience showed that it was preferable to interpret the result of the test with albustix as either "protein-free," "some protein present," or "much protein present." An appreciable number of urines caused a reaction less intense than the lowest positive colour on the chart, presumably indicating the presence of protein in a concentration of less than 30 mg./100 ml. The level at which proteinuria can be regarded as significant is, as yet, still undecided.

Of the 1,119 urines tested, the albustix and sulpho-salicylic acid (S.S.) test agreed in 98.1%, both being negative in 856 and both positive in 242 urines. There was a close parallelism between the intensity of the reaction in both tests, a "one-plus" or trace reaction with S.S. corresponding to the first colour change on the makers' chart, and a heavy precipitate on S.S. corresponding to the intenser shades of the albustix chart.

Discrepant results between the two tests were noted in only 21 urines (1.9%), indicating that essentially the same information is obtained by both tests. Of the 21 discrepant tests, 11 were in urines in which the albustix test was negative, whereas the S.S. test showed the presence of a trace of protein. Six of these 11 urines were available for retesting, and of those re-examined the opinion expressed at the time of first testing was confirmed. These urines also showed the presence of a detectable trace of protein on applying the heat coagulation test. It is possible, therefore, to record false-negative reactions with albustix; for this series of observations, however, especial care was being taken to observe the S.S. reactions, and it is possible that, in some instances, at any rate, a trace reaction might not otherwise have been recorded. This is probably not a significant defect of this diagnostic agent, but Frazer (1958) also noted, on progressive dilution of protein-containing urines, that it was possible to achieve dilutions at which the S.S. and heat coagulation tests showed a faint positive reaction but the albustix test was negative.

The remaining 10 urines in which discrepant results were noted were those in which a colour change was recorded on the albustix strip but no result was recorded following the S.S. test. Five of these urines were rechecked. In three the S.S. test did in fact show a positive trace reaction, although this had not been noted when originally the urine had been tested. The discrepancy, therefore, was due to faulty interpretation of the standard, not of the new test. One urine on retesting was definitely negative to both tests, and the originally recorded positive albustix reaction may have been due to the presence of mucus. Streaks of mucoprotein cause a positive but streaky and patchy reaction with the albustix strips, and this was usually ignored and a further sample of the same urine was retested. Only one of the retested urines, with a *p*H of 6.4, had an inexplicable positive albustix reaction and a negative S.S. and heat coagulation test. Dr. S. C. Frazer found this urine to have a heavy bacterial content (24 hours after being passed), and this may have affected the buffering capacity of the urine. No protein was detected in a centrifuged specimen, but the albustix reaction remained positive. The patient, a diabetic, had had urinary infections previously, but was asymptomatic, and subsequent samples examined were normal.

COMMENT

For all practical purposes albustix strips give the same order of information as is obtained by testing the urine with S.S. An error of only 1.9%, on the basis of a presumably correct interpretation of the S.S. test, is negligible; and, in any case, some of the discrepant tests were due to faulty interpretation, not of albustix but of the S.S. test.

This paper strip test, requiring no glassware, no reagents, and no heat source, and being standardized, constant, and stable as a testing agent, has obvious advantages which will commend it for more general use in hospital and domiciliary practice. Any slight increase in cost per test carried out is amply compensated for by its speed, reliability, and portability.

I am indebted to Mr. D. H. Vobes, of Ames Company (London) Ltd., for the supply of albustix strips, to Dr. S. C. Frazer for his advice, and to Sister Kathleen Rose for her enthusiastic help.

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Reviews

SURGERY OF BREAST AND GENITO-URINARY SYSTEM

Operative Surgery. Under the general editorship of Charles Rob, *M.C.*, M.Chir., F.R.C.S., and Rodney Smith, M.S., F.R.C.S. Volume 7: *Breast; Genito-urinary System.* (Part XIV, pp. 44; Part XV, pp. 273; illustrated. £5 10s.) London: Butterworth and Co. (Publishers) Ltd. 1958.

Seventeen surgeons from various parts of the world, including Ontario and Ceylon, have contributed to this volume, which deals with operations on the breast and the genito-urinary organs (excluding the uterus and ovaries). The standard of previous volumes has been maintained. The radical operation for cancer of the breast is well described and figured; the editors have not thought it necessary to illustrate some extensions which have been recently advocated. The ordinary renal operations are illustrated and a number of varying techniques for the cure of hydronephrosis included. One would like to see added the simple technique for opening a metastatic perinephric abscess before it has given any external evidence of its existence. A full account of every type of prostatectomy (with the exception of the perineal approach) will be found here; as many as 17 illustrations accompany the excellent description of Wilson Hey's technique. There is a good account of total cystectomy, and the method of making a new bladder out of a segment of ileum brings this section well up to date. On pages 265 and 266 there is a novel use for a pair of bone forceps.

ZACHARY COPE.

HEPATITIS

Hepatitis Frontiers. A Henry Ford Hospital International Symposium. Edited by Frank W. Hartman, M.D., Gerald A. LoGrippo, M.D., John G. Mateer, M.D., and James Barron, M.D. (Pp. 595+xvii; illustrated. £5 10s.) London: J. and A. Churchill Ltd 1957.

This book is an account of a symposium on hepatitis held at the Henry Ford Hospital, Detroit, in October, 1956. It deals first with the anatomy, physiology, and pathology of the liver in relation to hepatitis. Viral hepatitis may occasionally damage the liver to such an extent that complete restoration of its structure is not possible. Although this commonly gives rise to a coarse nodular type of cirrhosis, it may leave a diffuse and uniform change which closely resembles alcoholic or Laennec's cirrhosis. Nevertheless, there is no justification for attributing all obscure cases of cirrhosis to the viruses of infective hepatitis and homologous serum jaundice. Non-alcoholic cirrhosis is a particular problem in young and middle-aged women, and in something like half of these cases the aetiology remains obscure. It is likely to remain so until we have a specific laboratory test for virus hepatitis.

The next section deals with the virology and epidemiology of hepatitis. Attempts to establish the virus in tissue culture have been disappointing. There seem to be few, if any, cases in which it can be proved that the virus of infective hepatitis or homologous serum jaundice has been transmitted across the placenta to the foetus, and neonatal hepatitis is probably a different disease. Sections III and IV deal with the prevention of hepatitis, and it is clear that the sterilization of blood and plasma before transfusion is difficult to carry out in theory and equally difficult to test in practice. There should be an absolute ban on the injection of human serum or plasma for diagnostic procedures, and there should be no unnecessary transfusion of these fluids. Sections V and VI deal with the diagnosis and clinical management of hepatitis. In diagnosis the chief event has been the elucidation of the direct and indirect van den Bergh reactions. Bilirubin undergoes conjugation with glycuronic acid in its passage through the liver; the glycuronide is far more soluble in water than the parent substance and is consequently more readily excreted in the urine. In acute hepatitis the routine use of corticoids is not advised, but they may be of value in extremely ill patients or in the subacute and chronic phases of the disease. The treatment of hepatic coma, or preferably precoma, by nitrogen elimination and neomycin has firmly established itself.

This book is attractively written, well illustrated, and beautifully produced, and it should appeal to a large number of medical readers. It cannot be said that it records any major advance in the study of hepatitis, but the minor successes and sorties are of much interest.

L. J. WITTS.

GYNAECOLOGICAL SURGERY

Surgical Gynecology, including Important Obstetric Operations: A Handbook of Operative Surgery. By J. P. Greenhill, M.D. Illustrated by Angela Bartenbach. Second edition. (Pp. 377. 65s.) Chicago: The Year Book Publishers, Inc. London: Interscience Publishers, Ltd. 1957.

Dr. J. P. Greenhill, of Chicago, well known for his many writings, notably the recent editions of *Principles and Practice of Obstetrics*, has now produced a second edition of *Surgical Gynecology*—a publication which first appeared four years ago. This small book contains a wealth of information. It is essentially an atlas of surgical technique, with each operation depicted in a series of excellent line drawings. Opposite each illustration is a succinct, step-by-step account of the technique. Almost all the usual gynaecological procedures are depicted, some of them in considerable detail; radical hysterectomy with node dissection has, for example, a series of 16 illustrations and eight full or part-full pages of text. Some less usual operations are included, such as the Strassmann operation for correction of a double uterus and an abdominal method of dealing with post-hysterectomy vaginal inversion. Besides gynaecological surgery (including caesarean section), the writer wisely extends his attention to those forms of bowel surgery that may be encountered by the gynaecologist; also to hernia repair and to the treatment of bladder and ureteric injuries. While emphasis is naturally laid on methods that are popular in the U.S.A.—for example, the Baldy-Webster operation has equal place with the Gilliam operation for the correction of uterine retroversion—the differences from the accepted practice in Great Britain are remarkably few, and the presentation will therefore have equal appeal to surgeons in both countries.

Although this book is mainly an atlas of surgical technique, it also includes a section of some 80 pages on the subject of pre-operative preparation and post-operative care. These pages contain a remarkable amount of up-to-date information and sound advice which every surgeon, trained or in training, could read with interest and profit. The modest size of the book may suggest that it is merely a synopsis of the larger works on operative surgery. This is not so. It is quite definitely a book in its own right; it contains a surprising amount of information and carries the stamp of a master surgeon and writer. To all gynaecologists, and perhaps even more to general surgeons who have gynaecology thrust upon them, this book, with its terse and easily read text and wealth of illustration, can be recommended as a very real help to the understanding of gynaecological surgery.

J. CHASSAR MOIR.

FLUID BALANCE

Body Water in Man: The Acquisition and Maintenance of the Body Fluids. By Maurice B. Strauss, M.D. (Pp. 286+xix; illustrated. 50s.) London: J. and A. Churchill Ltd. 1957.

This book, although only the same size as Starling's *The Fluids of the Body*, provides a most readable, scholarly, and authoritative summary of the advances in the field since 1909. It does not attempt to provide a guide to the detailed management of disturbances of water and salt balance or to review the subject in great detail. Rather it attempts, and very successfully, a synthesis of the published

work on the basic physiological processes which enable us to maintain a normal volume and composition of body fluids. The book opens with a consideration of the beginnings of life in the sea and the problems of adjustment to a terrestrial existence. This section is of particular value, because it brings together information which is widely scattered and difficult to find. Dr. Strauss goes on to discuss the mechanisms of thirst and appetite for salt and their role in homoeostasis, and finally considers the regulation of the renal excretion of these substances. Most accounts stress the detailed mechanisms in the kidneys themselves without much attention to the stimuli which initiate water and salt retention or loss. In contrast, Dr. Strauss devotes a good deal of attention to these matters and shows how sadly lacking our knowledge is of this aspect of the problem. The printing and format are excellent, the figures clear and informative, and there are good author and subject indexes.

G. M. BULL.

AUSTRALIAN MEDICAL SERVICES IN THE WAR

Australia in the War of 1939–1945. Series 5, *Medical.* Vol. III, *The Island Campaigns.* By Allan S. Walker, M.D., Ch.M., F.R.A.C.P. (Pp. 426+xvi; illustrated. 35s.) Canberra: Australian War Memorial. London, Sydney, Melbourne, Wellington: Angus and Robertson Ltd. 1957.

This volume contains a history of two wars being fought simultaneously in the same area—one against a male enemy armed with what are euphemistically called the conventional weapons of war; the other against a female, possibly the more deadly, armed with nothing more than a proboscis designed for biting and sucking. All through the history the mosquito holds the stage. It is a sad story in many ways, but a story of courage and determination in the face of almost insuperable odds—against nature on the one hand and a grim, capable, and determined human enemy on the other. It is sad because so much of the misery and the difficulties of the campaign might have been avoided had the advice of the medical experts been taken from the start. One has to confess that it was far too long before the commanders of troops realized their individual and very personal responsibility in the field of preventive medicine, or became alive to the fact that the maintenance of discipline in the face of the human enemy came a poor second to the harder discipline of field hygiene and malaria control.

The text is so full of detail that it requires very close reading to separate out the essential features of policy and strategy in the medical organization. One reads of the success of the policy of pushing forward surgical teams to the advanced dressing stations; little is said of the results, from the patient's point of view, of the magnificent efforts of those brave men who worked so hard under such difficult circumstances. Much is told of the work of individuals in field ambulances and sections of those units; little of the work of the casualty clearing stations or general hospitals. The British soldier, who, in this context, includes the Australian, is well known for his prowess in improvisation, but the possession of that art does not excuse those responsible for their failure to supply the troops with basic necessities such as stretchers or Thomas splints. The history brings out the numerous difficulties in dealing with casualties and sick in jungle warfare, and the great responsibility placed on comparatively young and unseasoned medical officers faced with so many difficult problems when separated from higher administrative assistance, and how well they shouldered these responsibilities. If this grim story does nothing else, it has shown that, no matter what the administrative difficulty or inconvenience may be, every soldier asked to fight in a tropical climate, from the commander-in-chief downwards, must be given the best possible advice and practical demonstrations in the preservation of health. All commanders must be thoroughly seized with their personal responsibility towards their men in this respect, and given the means to fulfil those responsibilities, if disaster worse than any a human enemy can inflict is to be avoided.

The author has given us a book of much interest. The excellent photographs emphasize, no doubt intentionally, many of the difficulties of the campaigns. The text would have been easier to follow had the maps been of the "pull-out" variety.

J. C. A. DOWSE.

PNEUMOCONIOSIS

Pneumoconiosis: Industrial Diseases of the Lung Caused by Dust. By P. F. Holt, Ph.D., D.I.C., F.R.I.C., M.I.Biol. (Pp. 268; illustrated. 50s.) London: Edward Arnold (Publishers) Ltd. 1957.

This book is intended to provide for the many different sorts of individuals interested in pneumoconiosis—scientific, practical, and administrative—an introduction to the subject and a guide to further reading. Since the author considers silicosis to be the most widespread type of pneumoconiosis, most of the book is devoted to silicosis. At least half of it is concerned with the chemistry of silica and its action on animal tissues. Medical readers whose chemistry is not their forte may find some parts of this section of the book rather hard going, but it is a valuable review of present hypotheses. In the medical section there are many statements which are open to criticism, and which may even be misleading to those not conversant with the subject. For instance, the description of coal-workers' pneumoconiosis is based on pre-war epidemiology and post-war pathology without any reference to recent epidemiological studies. In a short account of beryllium disease the main problem of differentiation from sarcoidosis is not mentioned. There is a useful section on preventive measures, but it makes no mention of the fundamental problems of human fallibility. Dust-sampling methods are briefly described, without adequate discussion of what parameters of dust should be measured in relation to disease. There is a useful bibliography of 657 references. It is unfortunate that careless proof-reading has led to the omission of 20 references that are given in the text. This book provides an introduction to the physical and chemical aspects of pneumoconiosis, but cannot be regarded as a dependable guide in the medical field.

C. M. FLETCHER.

THE SHOULDER REGION AT VARIOUS AGES

Degenerative Changes in the Sternoclavicular and Acromioclavicular Joints in Various Decades. By Anthony F. DePalma, M.D. (Pp. 178+xii; illustrated. 42s.) Springfield, Illinois: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 1957.

This monograph by a surgeon is concerned very largely with the gross and microscopic appearances of the clavicular articulations in subjects (of various ages) "whose hospital records on routine questioning revealed no clinical manifestations indicative of joint involvement and physical examination elicited no joint abnormalities"; it follows the author's similar study of the gleno-humeral joint (the reference to which is omitted from the bibliography) and is apparently intended to establish the normal appearances for each decade. This is a tall order fraught with difficulties in the shape of sampling problems and observer differences, and it is questionable whether the data presented are entirely adequate for such an ambitious project. The study emphasizes the relatively early onset and rapid progression of osteoarthritis in the acromio-clavicular joint as compared with the sterno-clavicular joint, and shows that this difference is associated with early degeneration of the articular disk in the former and its persistence in the latter. The relation of these changes to occupational habits, sex, and degenerative disease in other joints is not considered. There are numerous photographs and photomicrographs, but, somewhat strangely, only three radiographs of osteoarthritis are included. No other study similar to that presented in this monograph is available, and the book remains a useful, if limited, addition to our knowledge of the shoulder region.

J. BALL.

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EFFECTS OF ATOMIC RADIATION

At the beginning of 1956 the General Assembly of the United Nations set up an international scientific committee[1] for the purpose of preparing a report on the effects of atomic radiation. The committee has now completed its task and has published its report.[2] It is similar in general approach to the national reports already published, the British blue-book *The Hazards to Man of Nuclear and Allied Radiations*[3] and the United States National Academy of Sciences report *The Biological Effects of Atomic Radiation*.[4] The material of these two documents has been used in the United Nations report, and, in addition, the international committee has drawn on much wider sources of information. A formidable document of some 230 pages, it deals in considerable technical detail with the two main problems—the magnitude of the radiation dose from various sources being received by individuals and populations throughout the world, and the assessment of the biological hazards of exposure to such radiation.

In investigating the first of these problems the committee has achieved much, not only in the collection and analysis of existing data but also in the initiation of world-wide schemes to gather further information and in the standardization of techniques of measurement. Workers from many countries have contributed data on the present doses of radiation received by man from cosmic radiation, from the natural radioactivity of the environment, from fallout, and from medical uses of radiation and radioactive materials. As a result of this international collaboration it is possible to build up a useful picture of the different levels of radiation dosage received by man the world over. Accumulation of these facts, however, does not imply that the extent of the biological danger is also known. The report makes it very clear that knowledge of the physical conditions of radiation exposure far outstrips knowledge of its biological consequences, particularly where small doses and dose-rates are concerned. The subject of radiobiology is surveyed in great detail, but, as in previous reports, the amount of detail serves only to highlight our ignorance of the importance of the effects on man of small doses of radiation. Well-known difficulties are encountered in the extrapolation to man of data from research on experimental animals and in the application of the results of clinical and epidemiological studies to populations living in varying environments. The final answers to many outstanding problems must await general advance in biological knowledge.

As to the genetic effects of radiation, there is good evidence that any increase in radiation exposure will lead to an increase in number of mutations. The difficulty of assessing the consequences lies in lack of knowledge of the dynamics of mutations in populations. Increased exposure to radiation may also have somatic effects, but no new facts to aid the quantitative estimation of the risks for man are available, and the report adds little to what has already been published on this subject. Any quantitative estimates made at present have to be based on broad assumptions which future work may well show to have been incorrect. It is therefore not surprising that the report stresses the need for developing and extending the field of radiobiological investigation and, as a corollary, the need for the appropriate training of scientific workers. The international collaboration now achieved should be of the greatest value in the epidemiological study of groups of persons exposed to particular radiation risks, such as those living in areas of the world where the natural levels of environmental radioactivity are much higher than average.

No exception can be taken to the general conclusion of the report that no individual should receive unnecessary radiation, but it leaves vital questions unanswered. Some increase in our radiation background is an inevitable accompaniment of medical and industrial progress. A continuing assessment of the dangers of radiation and a progressive policy to reduce them is essential; but equally necessary is a continuing assessment of the benefits that can accrue from radiation. No new development in civilization is without its debit side, and there is a real danger of a loss of sense of perspective over this question. As was stated in the report of the National Academy of Sciences: "Despite the existing gaps in our knowledge, it is abundantly clear that radiation is by far the best understood environmental hazard. The increasing contamination of the atmosphere with potential carcinogens, the widespread use of many new and powerful drugs in medicine and chemical agents in industry, emphasize the need for vigilance over the

[1] The scientific members of the delegation from the United Kingdom were: Professor W. V. Mayneord (representative, first session), Dr. E. E. Pochin (representative), Dr. T. C. Carter, Mr. A. C. Chamberlain, Dr. W. G. Marley, and Mr. N. G. Stewart.
[2] *Report of the United Nations Scientific Committee on the Effects of Atomic Radiation*, 1958. New York.
[3] See *Brit. med. J.*, 1956, 1, 1418 and 1472.
[4] See ibid., 1956, 1, 1482.

entire environment. Only with radiation has there been determination to minimize the risk at any cost."

The reasonable course of action at the present time would appear to be not to forgo any of the benefits of radiation, but to ensure that all its applications are carried out with the minimum practicable exposure. Since in the more advanced countries of the world the main source of additional exposure at the present time is diagnostic radiology, the use of all techniques that will reduce the dosage during diagnostic examination becomes of great importance. The United Nations report will disappoint those who hoped for quick answers to the radiation danger, and the highly technical nature of much of it is likely to confuse, rather than enlighten, the non-specialist. But as an essay in international collaboration it is a remarkable achievement: its real value will be in the stimulus it must give to thought and work on the problems raised by the increasing use of ionizing radiation.

DEATH FROM ASIAN INFLUENZA

Just over a year ago the Asian strain of influenza virus A began its race around the world, and speculation was rife about its impact on the populations of Europe and America. All continents and countries were involved before 1957 closed, and from first to last the experience was one of high incidence but low mortality. W. J. Martin[1] computed the mortality in the great towns of England and Wales during an 11-week period to be 3,063, compared with 2,844 and 7,752 in the spring outbreaks of 1953 and 1951 respectively. Possibly the comparatively low death rate in 1957 was due to the relative sparing from Asian influenza of people aged 60 years or more.

The fatal illnesses have been the subject of several pathological reports. In 1957 C. Giles and E. M. Shuttleworth[2] reported 55 necropsies from Stoke-on-Trent, and J. F. P. Hers and colleagues[3] described the findings in 103 fatalities in Holland. More recently, in 1958, the Public Health Laboratory Service[4] analysed the records of 477 fatal cases in England and Wales and Northern Ireland. Reports have also appeared in Australia[5] and the U.S.A.[6] All these observers found essentially the same result. Apart from chronic conditions such as chronic bronchitis and emphysema, bronchiectasis, and the rheumatic or other forms of heart disease the acute lesions found at necropsy were those of tracheo-bronchitis and pneumonia. The lung lesions were often haemorrhagic and oedematous or contained abscesses, and the trachea was congested with membrane or desquamated epithelium such as has been described many times in fatal influenza.

Pathogenic bacteria found in the lungs included the *Staphylococcus aureus* in 60 to 70% of cases and pneumococci, *H. influenzae*, and haemolytic streptococci alone or with staphylococci in a further 5 to 16%. Organisms usually regarded as non-pathogenic were found in about 20% of the lungs, and in 8 to 20% of cases the lungs were bacteriologically sterile. The bacteriologists of the Public Health Laboratory Service found influenza virus in specimens from two-thirds of the 310 tested cases, and of those dying within five days of the onset of illness 80% yielded virus. Moreover, the isolation of virus was accomplished in about the same proportion of cases whether the lungs were sterile or contained bacteria. More of those patients under 4 or over 65 years of age had sterile lungs than those of intermediate ages, and it was concluded that the Asian influenza virus had itself caused death particularly in those patients who died soon after the onset of illness.

In a few fatal illnesses the patient had become comatose and was thought to have encephalitis. Such neurological complications of influenza have been recorded by several workers.[7-9] In one of these cases, the authors recovered influenza virus from the brain as well as from the lung, but in view of the high infectivity of the lung they rightly concluded that the brain specimens could have been contaminated at necropsy. The brain in fatal cases of influenzal encephalitis is described as being intensely congested with some perivascular haemorrhages and early microglial proliferation, but no perivascular cuffing. The trachea and lungs in such cases showed the usual purulent congestion already described in cases of fatal influenza without encephalitis. Such illnesses could be an extreme neurological complication of which the less severe were the usual demyelinating cases of post-infective encephalitis. Non-fatal cases of this sort were described recently by B. McConkey and R. A. Daws[10] and by J. H. Friedman and R. Cancellieri,[11] as well as by the authors already referred to. T. H. Flewett and J. G. Hoult[9] did not consider that the occasional comatose fatality could be regarded as an example of virus encephalitis, and they prefer the

[1] Martin, W. J., *Brit. med. J.*, 1958, **1**, 419.
[2] Giles, C., and Shuttlesworth, E. M., *Lancet*, 1957, **2**, 1224.
[3] Hers, J. F. P., Goslings, W. R. O., Masurel, N., and Mulder, J., ibid., 1957, **2**, 1164.
[4] Report by the Public Health Laboratory Service, *Brit. med. J.*, 1958, **1**, 915.
[5] Bowden, K. M., and French, E. L., *Med. J. Aust.*, 1958, **1**, 553.
[6] Oseasohn, R., Adelson, L., Masaro, K., and Stevens, D., *Clin. Res.*, 1958, **6**, 282.
[7] Dunbar, J. M., Jamieson, W. M., Langland, J. H. M., and Smith, G. H., *Brit. med. J.*, 1958, **1**, 913.
[8] Horner, F. A., *New Engl. J. Med.*, 1958, **258**, 983.
[9] Flewett, T. H., and Hoult, J. G., *Lancet*, 1958, **2**, 11.
[10] McConkey, B., and Daws, R. A., ibid., 1958, **2**, 15.
[11] Friedman, J. H., and Cancellieri, R., *N.Y. St. J. Med.*, 1958, **58**, 859.
[12] Henle, G., and Henle, W., *J. exp. Med.*, 1946, **84**, 623.
[13] —— —— ibid., 1946, **84**, 639.

view that an encephalopathy had developed on the basis of the severe anoxaemia and venous congestion associated with the haemorrhagic pneumonia.

The phenomenon of death due to influenza virus without the aid of pathogenic bacteria is unusual in man, though it is familiar to virologists working with strains of virus virulent for mice and ferrets. In these animals the epithelial lesions of the bronchioles are associated with widespread pulmonary oedema which leads to asphyxiation. In some recent human cases the degree of oedema was not overwhelming, and toxic effects of the disease on the heart and other organs may have played a significant part. Toxic effects of influenza virus in experimental animals were described as long ago as 1946 by G. Henle and W. Henle.[12 13] The liver and brain were the most susceptible organs. Multiplication of the virus was apparently not found outside the respiratory tract in animals dying from the toxic effects of large inoculations of influenza virus. Nor was any soluble toxin separable from the virus particles themselves by these or other authors. Perhaps the clinician should take these experimental results to heart when speculating upon the mechanism of death from human influenza. But the much commoner combination of influenza virus plus staphylococcal pneumonia is worth keeping in mind, because therapy may be successful in such cases.

PRENATAL INFLUENCES

As evidence continues to accumulate that few of the congenital defects can be accounted for exclusively on genetic grounds, the task of unravelling the role of prenatal influences becomes increasingly important. What is needed is an accurate record of events during pregnancy and labour, recorded at the time, and on a sufficient scale to give significant results in the case of conditions whose frequency is of the order of one or two per thousand births. So far these simple but exacting requirements have nowhere been met. Either observations have been based on very small numbers, or, more commonly, they have relied on a history recorded after the birth of the child. In spite of these restrictions it has been possible to show the importance of such broad influences as maternal age, parity, social class, and season of birth, but rubella is still the only specific condition known to produce a congenital abnormality in a substantial proportion of the children of mothers affected.

A recent report by Alison McDonald[1] examines the relationship between disease and disorders of the mother during the first three months of pregnancy and the incidence of congenital malformations. 3,295 women were interviewed at hospital or local authority antenatal clinics at the time of booking for their confinements, and their infants were examined at or soon after birth. Prospective investigations of this type have several advantages over retrospective inquiries. In the first place the information obtained during pregnancy is not biased by knowledge of its outcome. (By contrast, mothers interrogated after delivery are more likely to recall events such as emotional shocks and falls if the child is abnormal.[2]) Secondly, a history obtained early in pregnancy provides a more reliable record of events during the first three months. Even so, Dr. McDonald found that mothers' memories of the first month were relatively poor, especially in respect of minor acute illnesses. A further advantage of her particular investigation is that she herself took all but 240 of the histories, and less than 2% of the original series were untraced. Perhaps the only serious disadvantage is the small numbers which a careful assessment by a single observer makes inevitable.

Nevertheless so few good data have been recorded prospectively that it was well worth while to use Dr. McDonald's careful observations to explore the influence of conditions during the first three months of pregnancy.

A relatively common malformation such as anencephalus occurs about once in 500 births, so that experience of many thousands of deliveries is needed to give reasonable numbers of affected individuals. With small series it becomes necessary to group malformations, especially the major congenital defects, a procedure which is evidently undesirable. For example, the incidence of anencephalus shows a marked seasonal fluctuation, whereas that of spina bifida does not. Such differences may be obscured by grouping, even when, as in this case, the abnormalities affect the same system. Dr. McDonald found that, compared with normal births, those with major congenital defects were more frequently associated with acute febrile illnesses in the first 12 weeks, and with active or quiescent pulmonary tuberculosis. They also seemed to be more common if the mother had done heavy work during pregnancy. On the other hand the occurrence of defects appeared to be unrelated to a number of other influences—injury, fainting, administration of a general anaesthetic, vaginal bleeding, marked anxiety or emotional shock—several of which have been thought to be significant. Nor was there any difference between mothers of malformed and normal infants in respect of Wassermann reaction, rhesus group, or in the proportions who were unmarried at conception or who attempted to terminate the pregnancy. In view of the fact that all major defects are considered together, the results of this investigation must be accepted with some reservations. They do suggest, however, the need for caution in interpreting the positive results obtained by retrospective inquiry, particularly in relation to events about which mothers' memories are likely to be deficient, or more readily awakened by the birth of an abnormal child.

[1] McDonald, A. D., *New Engl. J. Med.*, 1958, **258**, 767.
[2] Record, R. G., *Proc. roy. Soc. Med.*, 1958, **51**, 147.

BACTERIA IN ANTISEPTIC SOLUTIONS

That a solution of cetrimide may actually contain living pathogenic bacteria, usually a species of *Pseudomonas*, and thus act as a vehicle of infection, was shown by E. J. L. Lowbury,[1] who traced this contamination of the solution to bark corks. Cork is notoriously difficult to sterilize, mainly because it is so poor a conductor of heat, and it should never be used for the closure of any bottle containing a sterile fluid. The elimination of these corks seemed to end this trouble, but a small mystery remained. All quaternary ammonium compounds are much less active against Gram-negative organisms than Gram-positive, but in fact a solution of cetrimide will kill added *Pseudomonas*: how then did the contamination of these solutions persist? The answer to this question was provided in a paper by K. Anderson and Ruth Keynes,[2] of Adelaide, in a recent issue of this *Journal*. They examined a glass flagon of 0.1% cetrimide closed with a large bark cork and found that it contained a paracolon bacillus. Not only did the solution destroy this organism when it was deliberately added, but it proved to be self-sterilizing when removed from the original flagon to another vessel. It seemed therefore that the act of removing the cork to obtain a sample must have regularly recontaminated it. That this was so was proved by severing the neck of the original container and placing it over an agar plate: removal of the cork deposited on the medium a shower of minute cork-dust particles from which colonies of the paracolon bacillus developed. When this operation was repeated over a liquid, enabling the organisms to be enumerated, 5,000 were recovered. It will be news to most people that cork behaves in this way, and it is gratifying that this minor mystery has now been fully elucidated.

A solution of a similar quaternary ammonium compound, "zephiran," was incriminated in a series of infections, many of them evidently serious, occurring in the King's County Hospital, Brooklyn, and described by S. A. Plotkin and R. Austrian.[3] According to these authors, no fewer than 40 patients in an 8-month period were found to have positive blood cultures, the organism in each case being a *Pseudomonas* forming a yellow-green pigment, but distinguishable by several characters from *Ps. pyocyanea*. Only one case is described in detail. A man undergoing treatment for a streptococcal bacterial endocarditis had a sudden rise of temperature accompanied by phlebitis at the site of a needle through which penicillin was being given by continuous infusion. The *Pseudomonas* was cultivated repeatedly from his blood; fortunately this additional infection responded to treatment with chloramphenicol, but in another patient it is mentioned as having been fatal. The same organism was found in a solution of zephiran used for disinfecting the skin before venepuncture, not only in this ward but in 2 out of 5 others. The explanation of persistent contamination of this solution was a different and apparently a new one. Swabs composed of gauze and cotton-wool with which to apply the solution to the skin were actually kept in it. Experiment showed that such material adsorbs the antiseptic from such a solution, depriving it of antibacterial activity. This may not be a common practice, but it is evidently a thoroughly bad one. No one reading this paper will question that the authors have uncovered yet another unsuspected source of nosocomial infection, but we are entitled to wonder whether *all* of the 40 patients with positive blood cultures really had a *Pseudomonas* septicaemia, because nothing is said about how the skin was disinfected when blood was taken for culture.

Such observations as these must also raise doubts of the suitability of this type of antiseptic for some of the uses to which it is put. It cannot be altogether coincidence that alone of all commonly used substances of this kind it has been found capable of becoming contaminated in two different ways with bacteria somewhat resistant to its action. Although staphylococci are much more susceptible, it is doubtful whether they are actually destroyed in the short time allowed when these substances are used as skin antiseptics. P. Story,[4] in a study of skin disinfection described in this *Journal*, found cetrimide reliable only when in alcoholic solution, and, since 70% alcohol was itself fully effective, the implication is that cetrimide can have contributed little to the combined effect. Those who believe in the quaternaries for skin disinfection might perhaps be well advised to think again.

[1] Lowbury, E. J. L., *Brit. J. industr. Med.*, 1951, **8**, 22.
[2] Anderson, K., and Keynes, R., *Brit. med. J.*, 1958, **2**, 274.
[3] Plotkin, S. A., and Austrian, R., *Amer. J. med. Sci.*, 1958, **235**, 621.
[4] Story, P., *Brit. med. J.*, 1952, **2**, 1128.

REHABILITATION AT HOME

Not only in hospitals is rehabilitation for the elderly invaluable: given in the home it can restore to activity old people who have been confined to bed after illness. A report[1] on this subject from the Nuffield Provincial Hospitals Trust describes an experimental home-treatment scheme in Belfast. The patients were selected by a geriatrician, who, with the help of the patients' general practitioners, prescribed suitable physiotherapy, supervised the treatment, and gave general advice on home care to the patients and their relatives. The physiotherapist visited the homes, using a station-wagon to carry her equipment: she gave exercises, short-wave diathermy, radiant heat, wax baths, and faradism, and helped in the education and encouragement of the patients. The results were good: 32% of patients were greatly improved, 35% improved, and 33% failed to respond. Some of the patients needed home helps, nursing care, laundry services, dietary supplements, and social diversion, as well as visits from the doctors and physiotherapists. The report shows that these needs can seldom be met by a single authority and usually require the attentions of several different statutory and voluntary services, as W. Russell Grant[2] has emphasized in his description of the physical medical service organized for a rural population in Hampshire. Few busy general practitioners have the time to make overtures to all the organizations or individuals who might help, and

[1] Adams, G. F., McQuitty, F. M., and Flint, M. Y., *Rehabilitation of the Elderly Invalid at Home*, 1957, Nuffield Provincial Hospitals Trust, Nuffield Lodge, Regent's Park, London, N.W.1.
[2] Grant, W. Russell, *Brit. med. J. Supplement*, 1956, **1**, 201.

the report suggests that there should be a co-ordinating or counselling centre, staffed by health visitors with special experience in the care of the aged. It is clear that in Belfast the work of the geriatrician helped the physiotherapist to obtain successful results: whether she would have obtained the same results without medical supervision and other measures aimed at restoring function is doubtful.

At the outset of the experiment an attempt was made to use electrical treatments in the home, but diathermy proved to be cumbersome and had a very limited field of use. Consequently it was decided to eliminate all such elaborate therapeutic frills and concentrate on teaching the patients to adapt themselves, within the limits imposed by the disability, to everyday life in the home. This teaching could include exercises and encouragement towards greater activity; practice in walking and climbing stairs; advice in practical things such as turning over in bed or getting up from a bed or into a bath; telling the relatives about the correct methods of lifting; checking the suitability of a chair or a commode; and advice on the placing of handrails and minor alterations in the home. Physiotherapy in the home is not readily available from the National Health Service. This report shows that if it is introduced it should be part of a well co-ordinated scheme of rehabilitation, closely linked with the other domiciliary services.

EMOTIONS AND ALOPECIA AREATA

Alopecia areata is a disease characterized by circumscribed bald areas affecting any hairy part of the body, but usually confined to the scalp. Single patches are not uncommon, but more often a number of lesions appear after a few weeks, and rarely all the scalp or body surface is affected—alopecia totalis and universalis. The disease occurs in both sexes and at all ages, but is commonest in young adults. The hair usually grows again within a few months, but occasionally the bald areas persist for years or a permanent alopecia totalis or universalis is the result. Though the majority recover, even without treatment, the disease often tends to recur at intervals. S. A. Walker and S. Rothman,[1] in a follow-up study of 120 cases, found that the disease recurred in 86% within a period of five to twenty years. A familial tendency was stressed by R. Sabouraud, but without the knowledge of the incidence of the disease in the population as a whole it is difficult to assess the significance of a positive family history. Though this is primarily a disease of hair follicles, it is interesting to note that nail changes are not uncommon in severe cases, and some observers claim there is an association with leucoderma.

Many different views have been expressed and theories advanced to account for the condition and its behaviour. Unknown toxins, focal sepsis, endocrine upsets, eyestrain, and disturbed function of autonomic nerves have all had their exponents. The one belief which has persisted is that the condition is a psychosomatic manifestation. I. Anderson,[2] in a study of 114 cases, found that 23% had a history of mental shock or acute anxiety preceding the appearance of the bald patches. A further 22% were suffering from various forms of mental disturbance. There was, however, no correlation between persistence of the disease and the presence of mental disturbance. D. Irwin's series of 55 cases[3] contained 23% in which mental trauma was considered to have caused the condition and a further 63% classified as neurotic. S. I. Greenberg[4] reported 44 patients of whom only 7% were free from mental illness. Recently, however, Ida Macalpine[5] has carried out an extensive psychiatric study of 125 selected cases and can find no evidence that mental illness, anxiety, or mental shock play a significant part in causing alopecia areata. In this group of patients she found that 11% were, or had been, psychotic and 22% psychoneurotic, but 67% showed no sign of mental illness. Six patients gave a history of shock, to which the alopecia had been attributed, but a closer examination showed this to be fallacious. The percentage of mentally disturbed patients would appear, at first sight, to support the popular belief that alopecia areata is a psychosomatic manifestation, but a study of the periods of mental stress revealed no correlation with the attacks of alopecia. A larger percentage of patients suffering from alopecia totalis were mentally disturbed, but a study of the duration of the attack of alopecia and of previous attacks led to the conclusion that this was due to chance, or to the effect of the disease on the mind. As to the effect of psychotherapy, Dr. Macalpine records that, though the mental state of many patients improved, the alopecia was not influenced in any way. Moreover, many patients had been made more despondent by being told that alopecia is a nervous complaint, with the implication that they were mentally ill without knowing it. The following passage from Dr. Macalpine's paper applies to all disease and is worth keeping in mind: "It is of course well known that psychological factors can influence any organic illness for better or for worse, but in order to justify its being labelled psychosomatic it must be shown that emotional or psychological factors play the initiating role. Otherwise the term psychosomatic will be extended so far that ultimately no organic disease will escape being labelled psychosomatic and no advance be made in diagnosis, prognosis or therapy."

[1] Walker, S. A., and Rothman, S., *J. invest. Derm.*, 1950, **14**, 403.
[2] Anderson, I., *Brit. med. J.*, 1950, **2**, 1250.
[3] Irwin, D., in *Emotional Factors in Skin Disease*, 1953, London.
[4] Greenberg, S. I., *Arch. Derm. Syph. (Chicago)*, 1955, **72**, 454.
[5] Macalpine, I., *Brit. J. Derm.*, 1958, **70**, 117.

THIOL COMPOUNDS IN DIABETES MELLITUS

There have been a number of reports that the administration of thiol (-SH-containing) compounds may lead to an improvement in forms of clinical and experimental diabetes. The diabetogenic effect of alloxan in experimental animals may be diminished by previous administration of glutathione or by feeding diets which conserve or increase body stores of this substance.[1] Glutathione and B.A.L. (British anti-lewisite or 2:3 dimercaptopropanol) appear to reduce glycaemia and glycosuria when administered to some patients with spontaneous or A.C.T.H.-induced diabetes.[2,3] The

mechanism of the antidiabetic effect of glutathione and of B.A.L. has until recently received little attention.

J. W. Conn and colleagues[2] suggested that glutathione might lower the blood-sugar level in cases of diabetes induced by A.C.T.H. either by protecting the β cells of the pancreatic islets from the harmful effect of an alloxan-like substance or by protecting from inactivation enzymes concerned with glucose utilization. Another possibility is that these substances might directly increase the uptake of glucose by muscle. There is evidence that glutathione may stimulate glycolysis in yeast,[4] and many substances known to have this property also increase the uptake of glucose by muscle.[5] One such substance is salicylate,[6] which is also effective in diminishing glycaemia and glycosuria in diabetic patients.[7]

W. J. H. Butterfield and R. H. S. Thompson[3] have recently investigated the effect of B.A.L. on carbohydrate metabolism in diabetics. They find that treatment with B.A.L. reduces glycosuria and improves the response to insulin in some cases of diabetes (responders) but not in others (non-responders). In further experiments they have measured the change which occurs in the level of pyruvate in the plasma over a period of one hour after the administration of glucose plus insulin. They find that there is a greater rise in plasma pyruvate under these conditions in the responders than in the non-responders, and that this is greatly reduced in the responders by previous treatment with B.A.L. This has led them to suggest that there is a block in the metabolism of glucose in these patients at the level of the pyruvic dehydrogenase reaction, and that B.A.L. prevents a rise in the plasma level of pyruvate by restoring activity to the pyruvic dehydrogenase system. Since they believe that B.A.L. does not exert hypoglycaemic effect in normal people, the authors suggest that it may improve glycaemia in diabetic patients by facilitating the metabolism of pyruvate.

However, it may be that a defect in the intracellular metabolism of pyruvate does not diminish the uptake of glucose by cells. Thus arsenite, which inhibits the oxidation of pyruvate, actually increases the uptake of glucose by muscle.[5] Moreover, it has been claimed that B.A.L. is hypoglycaemic in normal animals if administered in small doses.[8] Failure to demonstrate hypoglycaemic effect of larger doses of B.A.L. in normal animals appears to be due to the release of adrenaline and adrenal steroids.[8] In this respect B.A.L. may resemble salicylate, which, though not hypoglycaemic in normal animals, nevertheless lowers the blood-sugar level in adrenalectomized or diabetic animals, apparently by increasing the uptake of glucose by muscle cells.[6] Thus, though there may be a defect in pyruvate metabolism in some diabetics, further evidence that B.A.L. improves glycaemia by correcting such a defect would be welcome. As Butterfield and Thompson emphasize, the interest in B.A.L. and diabetes lies not in a possible therapeutic use for B.A.L. but in its mode of action and the information which may thereby be provided about metabolic abnormalities in diabetes mellitus. The evidence does not suggest that B.A.L. has any place in the treatment of the disease.

[1] Lazarow, A., *Physiol. Rev.*, 1949, **29**, 48.
[2] Conn, J. W., Louis, L. H., and Johnston, M. W., *Science*, 1949, **109**, 279.
[3] Butterfield, W. J. H., and Thompson, R. H. S., *Clin. Sci.*, 1957, **16**, 679.
[4] Quastel, J. H., and Wheatley, A. H. M., *Biochem. J.*, 1932, **26**, 2169.
[5] Randle, P. J., and Smith, G. H., *Biochim. biophys. Acta*, 1957, **25**, 442.
[6] Manchester, K. L., Randle, P. J., and Smith, G. H., *Brit. med. J.*, 1958, **1**, 1028.
[7] Reid, J., Macdougall, A. I., and Andrews, M. M., ibid., 1957, **2**, 1071.
[8] Prout, T. E., Weaver, J. A., Scott, G.W., and Asper, S. P., jun., *Metabolism*, 1958, **7**, 240.

JET INJECTION

The use of a high-pressure hydraulic system to force a fine jet of fluid into the tissues has come to be known as "jet injection." The method, to which we first drew attention ten years ago,[1] has the obvious psychological advantage that no needle is required, and it is reported to be safe and simple to use. The injection material is contained in sterile metal ampoules, so that problems of sterilizing needles and syringes do not arise. There are, however, disadvantages. The equipment is expensive and is liable to minor mechanical faults after prolonged use. Bruising, blistering, and even laceration may occur if the nozzle is not pressed firmly against the skin. The latter must be dry (acetone is recommended for preparation of the skin) and the muscles relaxed. It is not possible to inject oily solutions because of the small size of the nozzle opening, and this sometimes becomes plugged. Finally, the operator has little control over the depth of injection because of individual variation in tissue density, and there is always a risk of piercing a blood vessel.

Three papers from the United States illustrate some of the potentialities of this technique. M. Ziff and his colleagues[2] have used a "hypospray" jet injector for intra-articular and local injections of hydrocortisone in patients suffering from a variety of rheumatic conditions. They confirm the speed and simplicity of the method and the fact that it was almost completely painless. Various investigations showed that by no means all the injected material entered the joint cavity, but this was not thought to be a serious drawback in rheumatoid arthritis, where periarticular tissues are affected. The therapeutic results were as good as those reported after conventional injections. The second paper[3] describes the use of jet injection to inoculate 20,000 Servicemen against influenza. The authors are enthusiastic about the saving in time, equipment, and manpower; once familiar with the technique, they were able to make over 700 injections an hour. A satisfactory immune response was obtained in a small sample selected for follow-up. No case of pre-injection syncope occurred in the whole series. The third report[4] is concerned with the antibody response in a group of 34 children given poliomyelitis vaccine by jet injection. The authors found just as good a response in these children as in a control group who received the vaccine by syringe and needle. From the two last reports it seems that jet injection might be of particular use when mass immunization schemes are undertaken.

[1] *Brit. med. J.*, 1948, **2**, 830.
[2] Ziff, M., Contreras, V., and Schmid, F. R., *Ann. rheum. Dis.*, 1956, **15**, 227.
[3] Anderson, E. A., Lindberg, R. B., and Hunter, D. H., *J. Amer. med. Ass.*, 1958, **167**, 549.
[4] Lipson, Martha J., *et al.*, *Amer. J. publ. Hlth*, 1958, **48**, 599.

CANCER IN KAMPALA: A SURVEY IN AN UNDERDEVELOPED COUNTRY

BY

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The incidence of cancer amongst the indigenous inhabitants of the African continent has not been established in any area, and estimates have varied from the old statement of Cook (1901) that in Uganda cancer was probably as common as in England, to a recent statement by John Gunther (1955) that cancer is "almost unknown" in Africans. Reports of biopsy and necropsy studies from various parts of Africa (see Steiner, 1954) have suggested that the types and sites of cancer vary considerably in their frequency from those seen in Europe or America. The differences have not as yet been brought out clearly, but they are of general and of local importance. If differences could be clearly demonstrated they might throw light on possible environmental causes of cancer, and the information gained would be of considerable use in local diagnosis and treatment.

In 1951 the Faculty of Medicine of Makerere College set up a Cancer Research Committee to study the incidence of cancer in the local population, as it seemed possible that circumstances would be favourable to a study of this kind. This hope has been borne out by experience. As the final results of this survey will not be available for some years, and as some of the problems encountered in carrying out a cancer survey in an underdeveloped country may be of interest to others, we are publishing this preliminary report.

Kampala and its Medical Services

Kampala (altitude 4,000 ft.—1,220 metres) sited at the north-west corner of Lake Victoria just north of the Equator, is the largest town and the commercial capital of Uganda. A small island of dwellings, mostly European and Asian, together with business and industrial concerns, in a sea of freehold African land, its resident population is augmented daily by the large number of rural-dwelling Africans who cycle in to work in the town. African conurbations are of recent growth and house only a small proportion of the African population. Communication with the town by road and rail is remarkably good; a series of roads radiate outwards and a network of bus services operate from Kampala all over the country. Travel is easy, and movement of people and of goods along the roads is considerable. The wealth of Uganda is founded on its production of cotton, coffee, and tea, and, although there have been mining developments and a rapid expansion of light industries in recent years, the great majority of Africans are still rural dwellers engaged in agriculture.

The specialist medical services of the Uganda Protectorate are largely concentrated in Kampala, so that many patients are referred there from up-country hospitals in addition to the large number from near and far who attend the Kampala hospitals on their own initiative. Three of the six hospitals—Mengo, Nsambya, and Rubaga—are run by missions; the Government operates Asian and European hospitals and Mulago Hospital, its largest institution, which is also the teaching hospital of the medical school. No private nursing-homes or hospitals exist, and there are relatively few general practitioners. The hospitals deal with all local cases of serious disease, but are also besieged by hordes of patients, whose complaints vary from the trivial to the rapidly lethal. While most of these patients are local, others may come vast distances (Monger, 1951), from ocean to ocean and from the Sahara Desert to South Africa. Hausa, Zulu, and Somali figure in the hospital records, and notable linguistic difficulties may be encountered in dealing with far-travelled patients. Pressure on beds is extreme; there are no radiotherapeutic services of any sort, and patients beyond hope of cure or relief have to be discharged to their own homes or to the care of friends. No systems of medical certification or of civil registration of death exist, or under present circumstances could exist, in the country as a whole, although in some places deaths are supposed to be recorded by the local chiefs. Nothing is known, therefore, of the mortality from cancer or from any other specific disease.

The possibility of a cancer survey in Kampala was based on the happy relationships that have existed for many years between the staffs in the Kampala hospitals. It seemed possible that with the good will and co-operation of the clinicians all cancer patients coming to the Kampala hospitals could be registered. This would at the least provide data on the relative frequency with which certain types of cancer occur in the locality, while the recording of the addresses might make it possible to calculate minimum cancer incidence rates for some areas. Such a registry would exclude an unknown number of patients who did not attend hospital, whether or not they were seen by a general practitioner.

A pilot survey carried out in 1951 had shown that very few of the out-patients suspected to be suffering from cancer were not admitted immediately, clinicians preferring to make a more careful assessment in the wards than was practicable in a crowded out-patient department. Subsequent experience has been similar. Thus, while 796 cancer patients were registered in 1952–3, only 37, 15 of them with advanced carcinoma of the uterine cervix, were seen as out-patients alone.

As it was clear from the pilot survey that a registry of in-patients would include virtually all cancer patients coming to the Kampala hospitals, it was decided to embark on a retrospective survey of the hospital records for the years 1952–3. The information thus obtained on the 796 cancer patients attending hospital was defective in many particulars; the sex was not stated in 2, the ages in 58, the tribe in 90, and the address in 68 cases. Moreover, a more serious defect was that the details could not be checked with the patients or relatives. As such a retrospective survey was unsatisfactory, with the help of the British Empire Cancer Campaign the survey was put on a current basis by the appointment of a Cancer Registrar (B.A.W.) in 1954. The cases registered in 1952–3 are, however, used in the subsequent analysis in this report, but only where the full required details were available. The analyses will therefore underestimate the true position.

Organization of the Current Survey

In view of the excessive clinical responsibilities of the hospital staffs and the lack of skilled assistance, it was unreasonable to ask them to fill in a detailed registration form. The duties of the cancer registrar include, therefore, the regular visiting of all the wards and out-patient departments of all the hospitals to obtain the required information and to ensure complete reporting. Clinicians notify cases to the registrar either directly or through sisters, nurses, or orderlies. Notification is sometimes delayed until the diagnosis is complete, but this can have unfortunate results in that information on social details cannot then be checked with patients or relatives. For this reason early information

given by sisters, orderlies, and students is very valuable. It is of no moment if patients are registered who turn out not to have malignant disease, as these can be eliminated from the records later. It is much more serious if the essential details cannot be obtained and checked with the patient or relative.

Notification cards are available in the out-patient departments—the only record required from the clinician—for details of patients seen in the out-patient department but not immediately admitted to the wards. This procedure is necessary, since some patients say they will return to the hospital after they have been home but fail to do so, while others may run away between the out-patient department and the wards.

The clinical details of registered cases are obtained from the notes in the relevant departments. In addition, completeness of registration is ensured by regular scrutiny of the histology department records, operation registers, and hospital in-patient records, and of reports submitted by the x-ray department on all tumours seen by them. This procedure was followed in 1954–5. Since 1956 an African social worker has been appointed who is directed by the registrar to interview patients. In the case of out-patients he goes immediately to the patient's home for this purpose. He fills in quite an elaborate form in which age, sex, tribe, and address are recorded, the latter in detail of site, village, county chief's name, type and construction of house, nearest important objects, and how to get to the patient's home. The names and addresses of next of kin, of children, friends, and relatives, are recorded as well as the name of the person who looks after the patient when ill at home. In recent months, where this information is available, our social worker, Mr. Y. Kayanda, has been able to obtain a 100% success in follow-up work several months later.

The information thus available could be grouped under four heads: (1) Personal details—name, age, sex, tribe, residence, next of kin, etc.; (2) registration details—hospital, year of registration, hospital number, registry number, ward, clinician, department, etc.; (3) clinical details and reports; (4) final diagnosis. Every case reported to the registry is recorded in the master register, and the information is also placed on a specially printed Copeland Chatterson analysis card. Microscopical sections, either from biopsy or necropsy, are filed in the registry.

Cases are retained only if there is satisfactory evidence of a malignant neoplastic process. Where a histological diagnosis is not available the clinical notes are individually reviewed by the Cancer Research Committee, which consists of physicians, surgeons, gynaecologists, and a radiologist, as well as pathologists. In each year the histological diagnosis rate has been over 70%, and where no such diagnosis is available clinicians often assist the committee by recording special comments. The types of case in which there is no histological confirmation vary very much. Many are hopelessly inoperable cases of carcinoma of the cervix uteri, others may have been examined radiologically, or by laparotomy, thoracotomy, or some other exploratory operation, while in others a tumour may have been viewed through some instrumental approach. Some patients absconded before they had been examined fully or before a biopsy could be made. In addition to well-recognized malignant tumours the register includes leukaemias, Hodgkin's disease, adamantinomas, mixed salivary tumours, dermoid tumours, meningiomas, recurring fibromas, Kaposi sarcomas, and developmental tumours of the ovary.

Difficulties Encountered in Registering Patients

Difficulties of many kinds have been encountered in organizing the survey, many of them of a nature rarely encountered in more developed communities and nearly all concerned with the personal details of the patients. The *name*, or the details of its spelling, may be given and recorded differently at various times, as on repeated admissions to the same hospital or on admission to different hospitals. Partial recording may cause difficulty, as when one patient attended three hospitals and was biopsied three times, once as "Kosia," once as "Kolo," and the third time as "Kosia Kolo." The patient may change his name at puberty, on marriage, or on becoming head of a family or clan. A false name may be given with the idea of warding off evil effects, or there may be a deliberate change of identity. For example, a patient in hospital gave the name of a prominent resident of her village, and on another occasion a robust individual interviewed at home claimed to be the person last seen with advanced cancer in hospital, but later admitted he was the brother who had assumed the name, house, and assets of the deceased patient.

An alphabetical or name register is therefore no safeguard against mistaken identities or against registering the same patient on several occasions. It has, however, been found useful to keep a tumour-site register separately, and this, together with close and persistent questioning, has prevented such duplication. The difficulties of this task are enhanced because in certain communities the list of names used is very restricted.

Age-recording in African patients is also very difficult, largely because until recently there was little point in an African knowing his or her age. Young people now seem to have a fairly accurate knowledge of their age, and for males the eighteenth birthday, after which they become liable for poll tax, is an obvious landmark. If the patient can be made to think it important, the age can usually be established within reasonable limits, and as an aid the committee has issued a dated list of local historical events. Despite care, however, the ages can be estimated only approximately in patients who come from far-away areas and speak languages for which it may be difficult to find an interpreter.

The *tribe* may not be recorded or stated, on the ground that it is of no importance or because the patient may wish to conceal the fact that he is not a local inhabitant. In view, however, of the many dietetic and other differences between tribes, the recording of these data is considered important.

The failure to record *addresses* accurately rendered the retrospective survey unsatisfactory, and indeed the addresses may be difficult to obtain. Some patients simply do not know where they live in a geographic sense, and for those who live in a vast, flat, sparsely inhabited and featureless area of the African bush this is understandable. They just live "over there." Usually the village—not a compact housing area but a geographical expression—the sub-county (*gombolola*) and the county (*saza*) can be recorded, especially for the local inhabitants and permanent residents. Men in particular should know the name of the chief to whom poll tax is paid; women and immigrants with no particular reason to remember the name of their locality are often vaguer about where they live. Indeed, this has sometimes to be established by finding the bus route along which they travelled to Kampala. For those who travel long distances it is sufficient to establish that they are not residents of Mengo District (see below). Some such, however, may stay in the environs of Kampala and give "accommodation" addresses. Close questioning may be necessary in order to establish the true facts, and it is often found that such persons are unlikely to be specific about the local chief's name or headquarters.

Basis for a Statistical Analysis

In 1955 one of us (J. K.) was enabled by a grant from the British Empire Cancer Campaign to visit Uganda to analyse the available material and to advise on the future programme. There were available the results of the retrospective survey of 1952–3 and of the 1954 current survey. The number of cancer cases registered in three years was very uniform, being 402, 396, and 395 respectively. The appointment of the registrar had thus not led to an increase

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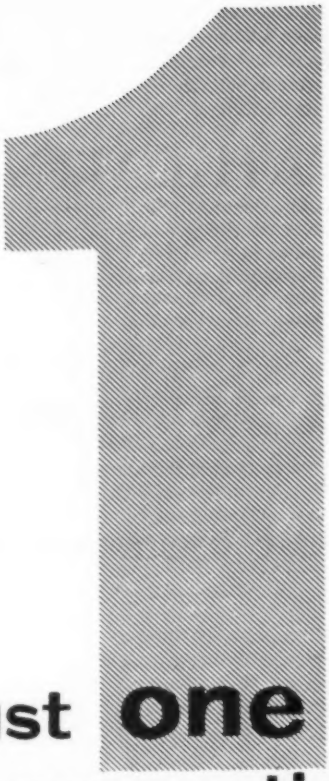

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in the number of cases registered, but it had greatly improved the quality and completeness of the information obtained.

Although patients come to the Kampala hospitals from all parts of Uganda and beyond, many from the remote areas would be treated in hospitals nearer their own homes. Consequently, patients of the Kampala hospitals cannot provide a basis for calculating incidence rates for distant areas, and it was decided to limit the analysis to residents of Mengo District, an administrative area about 100 miles (160 km.) square, with Kampala as its centre. It was hoped that reliable cancer incidence rates might be obtained for such an area.

Geography of Mengo District

Mengo District is divided into 12 *sazas* of varying size and population. Kampala is in the saza of Kyadondo, which extends only a few miles each side of the town but about 20 miles (32 km.) to the north. It includes both urban and rural elements, and contains the population most accessible to the Kampala hospitals. Busiro and Kyaggwe, lying west and east of Kampala respectively, are the nearest to the town except for Kyadondo. These sazas are traversed by the main trunk roads leading to Masaka and Mityana in the west and to Jinja in the east, as well as by the railways. All the other sazas are more distant and have less ready access to Kampala.

The population of Mengo District is known at present only on the basis of a complete census taken in 1948. Knowledge of the population at risk is of course fundamental to the calculation of incidence rates. The 1948 census was a more complete and detailed census of the East African population than had ever been achieved before, and we have been reliably informed that over the whole of East Africa it is believed to have been about 95% complete. Since this would include many remote and primitive areas, there is reason to believe that in the more sophisticated areas around Kampala a high standard of accuracy was obtained. Some details of the population of Mengo District have been given in a previous paper (Davies and Wilson, 1954), and much important information is given by Richards (1954), whose studies have shown that in 1948 the highest concentrations of immigrants were in plantation areas remote from Kampala. The African population of Mengo District was then just over 900,000. The age distribution of the population was recorded in groups as follows: Up to 1 year, infancy; 1–5 years, early childhood without responsibilities; 6–15 years older childhood involving share in the family tasks; 15–45 years, maturity and working age; over 45 years, dependent old age.

In this connexion it is important to note that only 11.9% of the African population of Uganda were over the age of 45 years.

Preliminary Analysis

This was limited to cases occurring in residents of Mengo District of known age and address. The cases on the register were sorted by race, age, sex, place of residence, and year of registration—1952, 1953, or 1954—after elimination of all duplicate registrations due to readmissions. There were so few cases in Asians and Europeans, or of any race under 1 year of age, that the further analysis concerned Africans only, excluding infants. Age- and sex-specific rates for the whole of Mengo District were then calculated for each year. In general the pattern was very similar in each year, and to give greater stability to the rates the data for the three years were pooled. Further discussion is concerned with the average annual rates for the whole period 1952–4. Table I shows these age- and sex-specific rates for all cancer cases suitable for analysis in the whole of Mengo District.

TABLE I.—*Average Annual Incidence Rates Per* 10,000 *for All Types of Cancer Among Africans in Mengo District*, 1952–4

Age (Years)	Males		Females	
	Cases 1952–4	Average Annual Rate	Cases 1952–4	Average Annual Rate
1–5	6	0·39	8	0·51
6–15	20	0·69	10	0·46
16–45	201	2·40	171	2·87
Over 45	193	9·09	101	6·60

The numbers of cases were too small to calculate reliable age- and sex-specific rates for each saza. Therefore, to make regional comparisons within Mengo District, the age- and sex-specific rates for the whole area were applied in turn to the populations of each saza to calculate how many cases would be expected to be registered if reporting had been uniform throughout. The results of this analysis are summarized in Table II, which shows for Kyadondo alone, for Busiro and Kyaggwe together, and for the remaining nine sazas the number of cases registered in the three years, the number expected, and the ratio registered/expected expressed as a percentage.

TABLE II.—*Relative Incidence of Cancer, All Types, Among Africans in Different Parts of Mengo District*, 1952–4

Sazas	Males			Females		
	No. of Cases		Reg. Exp. %	No. of Cases		Reg. Exp. %
	Registered	Expected		Registered	Expected	
Kyadondo	167	64·2	*260*	98	41·6	*236*
Busiro and Kyaggwe	118	148·5	*79*	96	97·4	*99*
Other sazas	135	207·3	*65*	96	151·0	*64*
All Mengo district ..	420	420·0	*100*	290	290·0	*100*

For Kyadondo the incidence of cancer, based on registered cases, was over twice the average for Mengo District as a whole, with ratios registered/expected of 260% for males and 236% for females. For Busiro and Kyaggwe combined the incidence was about average for the district—ratios 79% for males and 99% for females—while the remaining nine sazas together had about two-thirds the average incidence (some had much less).

It seems unlikely that within a fairly homogeneous population there could be such large differences in the real risk of getting cancer. A more likely explanation is that there was relative under-reporting of cancer among Africans living some distance away and most complete reporting from those within easy reach of Kampala. Before such an explanation can be accepted, other possibilities have to be considered.

The first alternative explanation is that reporting was uniform throughout Mengo District but that the difference in rates was an artifact due to population changes since the 1948 census. The difference in rates could have been produced if by 1953 the population in Kyadondo had increased to about two to three times its 1948 total, the remaining saza totals being little changed. Such a selective increase could come about only by considerable immigration, principally to this one area, and no such large population movements had been recognized. The only information on population changes came indirectly from the number of poll-tax payers, males only from 18 years of age, in the area. From information generously provided by the Buganda Government it was established that by 1954 there had been an increase in the number of poll-tax payers over the 1958 figure of 39% for Kyadondo, 26% for Busiro and Kyaggwe, and 24% for the five other most populous sazas of Mengo District. Although the increase in Kyadondo was somewhat greater than elsewhere it was much too small to account for the relative excess of cancer reported in this one saza.

A second possible explanation of the high rates for Kyadondo is that patients from more remote areas might give local accommodation addresses, such as of clan relatives, when attending hospital. A follow-up survey carried out by the medical students in 1954 had been inconclusive, except to confirm Southall and Gutkind's (1956) findings that there was considerable population mobility in the

peri-urban areas of Kampala. In 1956, since the appointment of the African social worker, there has been no appreciable fall in the number of Kyadondo residents among new patients, which would suggest that "accommodation" addresses were not often given in earlier years.

A further possibility is that the rates were high in Kyadondo and low elsewhere because patients in remote sazas suffering from cancer would go to local hospitals and would not appear in a register based on Kampala hospitals. Within Mengo District there are three local hospitals, at Bombo, Entebbe, and Mityana, which might see cancer patients. In 1952 and 1953 only 26 cases of maligant disease were reported from them, and some of these patients may have been transferred to Kampala. Outside Mengo District the hospital at Jinja, just beyond the eastern boundary, might drain some patients, but a search of the operation records revealed only 16 possible malignant conditions in a period of nine months. The hospital at Masaka, on a trunk road 80 miles (130 km.) from Kampala, is too far to take Mengo District residents except a few from the thinly populated south-western part, and the remaining Uganda hospitals are still further away. The number of cancer patients attending local hospitals is therefore so small by comparison with those seen in Kampala hospitals that even if they were included in the register they would have little effect on the incidence rates for the different sazas.

We are left with the explanation that people living in remote areas are less likely to attend any hospital than those living near Kampala, and that incidences for such sazas based on hospital experience will be gross underestimates. For Kyadondo itself the rates should be a far better measure of the real risk, though any error is likely to be towards under- rather than overestimation. Such an explanation of the higher rates in Kyadondo is confirmed by an analysis of the site distribution of registered cases. The proportion with more superficial or easily diagnosable cancers, such as skin and penis in the male, skin and breast in the female, was greater in those from sazas other than Kyadondo, while the proportion with the more obscure internal cancers—for example, those involving the liver and lymphatic glands—was greater in Kyadondo patients. These site differences were not produced by selective transfer from local to Kampala hospitals of cases amenable to surgery.

Comparison of Kyadondo and Danish Cancer Incidence

Total Cancer Incidence

This preliminary analysis of the Kampala Registry findings for Kyadondo has been compared with the results of the Danish Cancer Registry for 1942–4 (Clemmesen, 1955) in Table III. The age groups used in the two surveys are not identical, but the more numerous groups of the Danish material were amalgamated to bring them as near as possible to the Kyadondo data. The Danish population was obviously older than that of Kyadondo, so that over 45 years of age the rates would not be comparable, but as a rough approximation the Danish rate for 45–54 years is given alongside the Kyadondo at over 45 years in Table III.

The Kyadondo rates were in general of the same order as those in Denmark throughout the age groups shown. The chief exception to this was that women over 45 years of age in Kyadondo had less than half the cancer incidence of Danish women 45–54 years of age. The corresponding rates for men were very similar. The choice of the Danish 45–54 year group as a proper comparison for the Kyadondo women over 45 may well be wrong, as some individual Africans were aged 70 or more, but any adjustment in this figure would only increase the differences between the two studies. On the other hand, the rate for Danish women aged 35–44 years—17.3 per 10,000—was slightly greater than the rate for Kyadondo women over 45. Since the reluctance of the older women to attend hospital is well recognized in Kampala, some degree of under-reporting in this group is to be expected.

TABLE III.—*Comparison of Incidence Rates for All Malignant Tumours in Kyadondo, 1952–4, and in Denmark, 1942–4 (Average Annual Rates Per 10,000)*

Kyadondo, 1952–4			Denmark, 1942–4		
Age	Rate		Age	Rate	
	Males	Females		Males	Females
1–5 years	0·5	1·6	0–4 years	1·62	1·08
6–15 ,,	2·7	0·3	5–14 ,,	0·85	0·64
16–45 ,,	6·0	7·0	15–44 ,,	4·43	8·19
46+ ,,	24·3	15·3	45–54 ,,	22·57	35·72

Site Differences

Particular interest lies in the incidence rates for individual sites. It is clear that in Kyadondo these show outstanding differences from the experience of highly developed communities, although the overall rates for all sites combined may be of the same order. In Table IV a comparison between the incidence of cancer of certain selected sites in Kyadondo and Denmark is shown. For this table the Danish rates for ages 15–44 were applied to the Kyadondo population 16–45 years of age, and the Danish rates at 45–54 years were applied to the Kyadondo population over 45 years of age to obtain the number of "expected" cases. The actual cases registered among Africans over 15 years of age can then be compared directly with these expected numbers.

From this provisional analysis a number of striking discrepancies appear—the excess of liver cancer in Kyadondo men but not in the women, and the excess of penile and, to a less extent, lymphatic tumours in men. The deficiency of cancer of the gastro-intestinal tract in both sexes is clear, and breast carcinoma of women in Kyadondo was also reported less frequently than in Denmark. The figures given in Table IV may obscure some differences. For

TABLE IV.—*Comparison of Incidence of Cancer of Selected Sites in Kyadondo, 1952–4, With that Expected at Danish Rates, 1942–4*

Site	Males		Females	
	Registered Cases	Expected Cases	Registered Cases	Expected Cases
Skin	14	10·5	4	5·9
Gastro-intestinal	18	35·4	10	20·1
Liver	26	2·0	2	1·9
Kidney, bladder, etc.	19	13·1	2	2·0
Penis	11	1·2	—	—
Breast	—	—	9	30·7
Ovary and tubes	—	—	12	10·6
Uterus	—	—	28	43·5
Lymphatic system	22	10·2	4	5·4

example, the total incidence of kidney and bladder tumours may appear to have been of the same order in Kyadondo as in Denmark, but this is largely because a deficiency in the renal carcinoma in Kyadondo was counterbalanced by a great excess of Wilms's tumour.

Too much emphasis should not be placed on these comparisons, and judgment should await the large experience it is hoped to accumulate from the Kampala registry. Nevertheless, the preliminary conclusions reached are that, for certain age groups at least, the total incidence of cancer in Kyadondo is similar to that in Denmark, but that there appear to be remarkable site differences.

Future of the Kampala Survey

In recent years this survey has been generously supported by an annual grant from the British Empire Cancer Campaign. It is hoped to continue the survey for at least one year after the conclusion of the next complete census, which is planned for 1958. It is also hoped to continue till the number of cases is sufficient to enable any differences in the incidence of the less common tumours to be explored. The indications are that some striking differences will be found in the incidence of certain less common tumours, such as Kaposi sarcoma, granulosa-cell tumours, and chorion-epithelioma. When the census returns are available it should

be possible to publish a full and detailed report which will enable valid comparisons to be made with other areas.

If the differences which it is believed will be shown up are confirmed, the task will be to explain these differences. This may need much more exploration of the social, economic, and medical backgrounds of the Kampala cases than we are attempting at present. It has been suggested that some of this work should be put in hand now. For a number of reasons the Cancer Research Committee has been reluctant to embark on such activities. Firstly, it has considered that its main task is to establish the cancer incidence figures in Kyadondo as accurately as possible, and other aims have been temporarily subordinated to this. This in itself put a considerable strain on the limited staff available, and any extension might prejudice the good will and co-operation of the Kampala clinicians which has been so generously afforded to the Research Committee. Further, the collection of data on the social and environmental background of cancer patients alone might be of little use because of the lack of similar information on Africans not suffering from cancer with which it could be compared. For these reasons the committee declined to consider suggestions for broadening the scope of its survey until its primary aims are achieved.

It does, however, feel confident, as a result of its experience, that a cancer survey of the type carried out is promising and worth while in an area in which it might superficially appear to be worthless and unrewarding. Granted the co-operation of clinicians, accurate recording of cases and pertinent data, and a knowledge of the populations at risk, and particularly with the accurate recording of the addresses, cancer surveys can be carried out in underdeveloped and underdoctored areas.

We would like to acknowledge the help of our colleagues of the Cancer Research Committee. The registry is financed by the British Empire Cancer Campaign, and a special grant was made to one of us to visit Uganda and South Africa. We are grateful for the help and advice of cancer research workers in many countries.

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DYSPAREUNIA

BY

ELEANOR MEARS, M.B., Ch.B.

The term "dyspareunia" evolved from the Greek word meaning "badly mated," but it is now most often applied to painful or uncomfortable intercourse. Those who are dealing with psycho-sexual problems in clinics or private practice know how often dyspareunia has been responsible for domestic unhappiness, emotional upsets, and marriage breakdowns. The patient who flinches and resists pelvic examination by lumbar extension and adduction of her thighs is by no means uncommon. Even in the limited time available in a family planning clinic the observant doctor who makes a few tactful inquiries and shows her awareness of and sympathy with the problem may find a grateful patient only too anxious to unburden herself and obtain advice about her distressing troubles.

Dyspareunia may be due to physical or to psychogenic causes. In the latter case it is always associated with vaginismus (spasm of the muscles of the vagina and introitus), but physical causes, too, may produce a vaginismus which may need treatment after the original cause has gone. While the patient with a dyspareunia due to physical causes may present herself complaining of discomfort at intercourse, in psychogenic cases the patient often comes with other presenting symptoms—for example, subfertility. It is indeed remarkable how ignorant lay people are and how often one finds on examination that the marriage is not consummated, sometimes without the patient being aware of this.

It is usually easy to distinguish between physical and psychogenic dyspareunia at the time of examination. The patient who is tender will flinch, but reassurance that she will not be hurt by examination will enable her to relax immediately. The patient with real vaginismus will reveal herself by her inability to do so.

Dyspareunia due to Physical Causes

The physical causes are many and should always be first excluded. They are dealt with briefly.

Traumatism.—Traumatism of the introitus and urethral meatus is quite frequent among the newly wed. It is sometimes associated with a low-grade urethral infection and is frequent enough to be called honeymoon dyspareunia. Cystitis should be treated when present and advice given to the husband *re* gentleness and preventing, temporarily, any pressure on the anterior wall of the vagina.

Vulvo-vaginal inflammation is a very common cause, with or without leucorrhoea. A severe trichomonal or monilial infection always produces some discomfort, particularly when penetration is attempted. Treatment will depend on diagnosis. Coitus is best avoided to begin with, and later a condom should be used to prevent reinfection. Inflammation of a rigid hymen or tender hymenal tags may need treatment. Pelvic infections, inflammations of the cervix, chronic pelvic congestion, cellulitis, salpingitis, etc., may all cause deep dyspareunia. Until treatment is complete a coital position should be adopted which will avoid deep penetration.

Senile Vaginitis.—After the menopause the vaginal mucosa may become dry and inflamed. The vagina and introitus often shrink : this may not cause difficulties in a gravid woman, but can be very troublesome in women who have never borne children, and particularly in those who have married late in life. Fortunately, the administration of oestrogen (I prefer it given locally—a small dose is sufficient—say, a pessary of 1,000 units inserted at night two or three times weekly) and the use of a lubricant are often all that is necessary. As it is more likely to occur if coitus is discontinued for a time and then resumed, it is sometimes advisable to give the woman a glass dilator to keep herself stretched, if for any reason coitus is temporarily discontinued.

Kraurosis Vulvae and Leucoplakia.—These are also common causes after the menopause. The vulval tissues may be dry and leathery, or show atrophic patches, later producing scarring, shrinking, and narrowing of the vulvar orifice. Dyspareunia may be intense. Kraurosis is sometimes confused with monilial infection and can be differentiated only by microscopical examination. Treatment is expectant in mild cases : the cause can often be held in check by thyroid therapy, and small doses of oestrogen are often very useful. A careful regular watch must be made for malignant changes.

Lax vulvo-vaginal tissues can produce dyspareunia, particularly if associated with retroversion and prolapsed ovaries. Exercise, faradism, and replacement of the uterus are all sometimes useful.

Endometriosis.—Dyspareunia is an almost constant symptom.

Perineorrhaphy.—A good repair may sometimes cause dyspareunia after the menopause, when the vaginal tissues lose their elasticity. Treatment is the same as for senile vaginitis.

Improper Technique.—Roughness on the part of the husband and inadequate coital technique and insufficient lubrication may all cause discomfort at intercourse. Sometimes even hairs forced into the vagina with coitus have been known to be the cause. Irritation, too, from an ill-fitting or inadequately lubricated condom may provoke this symptom.

Smarting from contraceptive chemicals is found occasionally, necessitating a change in the chemical prescribed. It is to be remembered, however, that any chemical is, of course, apt to produce smarting of a recently ruptured hymen.

Hymen difficulties are probably the most common of all. Discomfort is usually produced when intercourse is first attempted, until the hymen is broken or stretched. The amount of discomfort, of course, varies tremendously, and with a thick rigid hymen can be most troublesome. Where the hymen is slight and thin it is easily stretched or broken; the discomfort is transitory and soon forgotten. Where the hymen is thick and rigid the discomfort may persist for a long time. It is, alas, not uncommon to find patients who complain of dyspareunia for years after the hymen has been stretched, just because there was hymenal pain at the beginning of married life and this produced a habit vaginismus which remains. It might even persist after several pregnancies.

Vaginismus of this kind is very easily prevented by premarital examination and instruction in stretching the hymen gradually with the fingers. It is only rarely necessary to stretch it under local or general anaesthesia.

Where the hymen is rigid and treatment is delayed, vaginismus is always present (patients do delay seeking advice only too often—the history of unconsummated or uncomfortably consummated marriage may be anything from a few weeks' to several years' duration before the woman plucks up courage to visit a doctor; the longest I have known is 15 years). *It is not enough in these cases to stretch the hymen and remove the physical barrier. No vaginismus is ever cured by surgery.* A process of education in relaxation as outlined below is essential. Often, indeed, such patients give a history of earlier surgical intervention in or out of hospital, without any follow-up and without any improvement.

The patient who presents with an intact hymen a few weeks after marriage may be taught to stretch it herself digitally if she has a mind to try and the hymen is not too thick and rigid; but where the marriage is of longer duration the woman rarely feels able to try this, and a hymenectomy with a local analgesic or under gas, and preferably at the time of her visit, should be done. (Although the patient has procrastinated for so long, it is much kinder for the doctor not to put it off any further.) It is, of course, a relief to the patient to find that there is a physical explanation of her failure to consummate—it relieves her of a great load of guilt and makes her most co-operative.

Psychogenic Causes of Dyspareunia

In dyspareunia from psychogenic causes the pain is due to muscle spasm secondary to emotional tension. Vaginismus becomes a defence against sexual intercourse, and may have its roots buried so deeply that psychotherapy is needed to bring them to light.

Space does not permit me to discuss these at length, and, in any case, the clinic doctor can only diagnose and refer to someone skilled in psychotherapy.

Briefly, vaginismus is commonly due to infantile pelvic trauma with an enema, catheter, etc. For example, one patient whom I saw recently gave a history of attempted catheterization by a nurse in hospital at the age of 11. The attempt had to be given up because it was so painful. It is small wonder that she could not "bear to let anyone near her" since, and had a vaginismus after four years of marriage despite hymenectomy at two months. It may be due to fantasies of injury since childhood, to fear of being harmed (such patients often complain that the penis is too large): it may be a sign of masochistic acceptance of punishment or to unconscious sadism towards the husband because of identification with the father; it may even be due to mother fixation at the pre-oedipal level; it may be due to unconscious general hostility towards the opposite sex, to fear of pregnancy, to disinclination to accept the feminine role—perhaps because of hostility to father.

While many cases respond to the superficial therapy about to be outlined, some are doomed to failure at the outset by the nature and depth of their resistance. The doctor treating dyspareunia must learn to distinguish between them.

Treatment of Vaginismus

The *approach* of the doctor towards patients with vaginismus is most important. Most patients have had to summon all their courage to come with this problem. Many of them come reluctantly, urged by their husbands, make all kinds of difficulties, and are late for appointments, yet they must be met with kindness, sympathy, and understanding. The doctor must be articulate on sex matters and not inclined to condemn. The doctor is really a substitute for parental authority and by his/her attitude helps to neutralize the repressive effect of years of taboo and false attitudes. Occasionally a patient will seem completely self-possessed and rational about her problem, yet become quite hysterical when examination begins. Any such release of emotional tension is, of course, therapeutic. It is helpful to take time to talk about her attitude towards menstruation, sex relationships, and her upbringing, but if she does not discuss these matters easily without reluctance they can be left until later, when her confidence has been gained.

Then the patient is undressed and prepared for examination. This must be done very gently with explanations of what is being done and a full assurance that nothing will be done to hurt her. I always find it helpful to explain that the vagina is made of muscle and can always be tightened so that examination and intercourse are uncomfortable, even in a woman who has borne several children, and that neither is uncomfortable with a relaxed vagina. I further get her co-operation by assuring her how common the problem is and by promising to stop whenever she asks. I then see if she will let me gently insert one lubricated finger so that I can find out whether there is any physical difficulty. The patient is, of course, always relieved if there is a physical explanation so that she can feel it is not her fault. If there is no physical cause for the vaginismus, I explain to her how the vaginismus has come about (muscle spasm due to emotional tension). I reassure her that everything is quite normal otherwise (women are very often worried about whether they are too small inside), and I explain carefully that coitus must not be attempted until she has learnt to relax sufficiently and that no one can do this for her. Full explanation and reassurance along these lines usually makes them immediately co-operative.

I then ask the patient to insert something in her vagina, sometimes her finger, sometimes a glass dilator, sometimes a cap. I find it better to leave the choice to the patient: so often patients who have had a surgical hymenectomy followed up with glass dilators, without any explanation, have hated inserting dilators and found them consequently very painful, yet will insert a finger readily. On the other hand, there are some women who cannot bear to touch themselves with their fingers, but are quite happy to insert dilators. If, however, the patient also wants contraceptive advice, I find the cap the most useful of all. If there is any resistance to inserting a glass dilator it can produce a painful vaginal spasm which is only relieved by the patient removing it, thus justifying and confirming her fears, whereas a cap seems bigger to begin with, goes in

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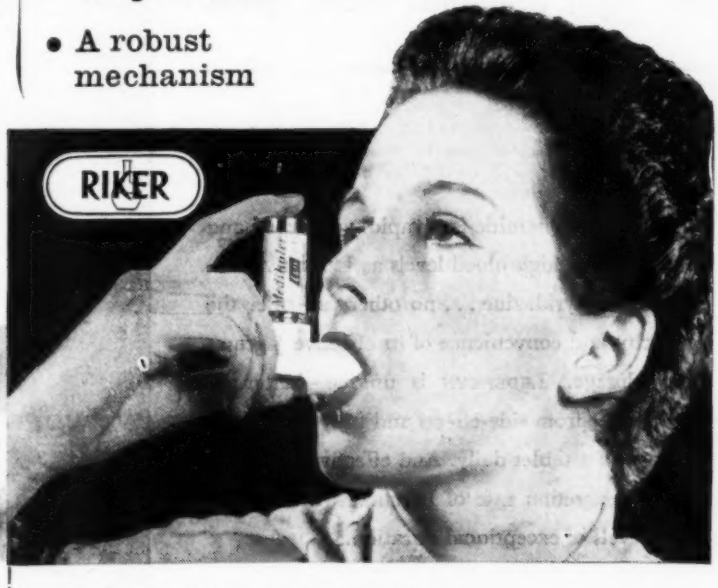

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easily, and, even more important, cannot be felt once it is inside, even with a severe vaginismus. I find this gives the patient a tremendous sense of achievement and relief, and she often expresses a feeling of surprise that something so big can go inside without worrying her.

Whatever method is decided upon she should be encouraged to insert it, adopting a stooping position and pushing in a backward and upward direction. A simple anatomical explanation with a diagram or plaster cast makes it easier for her to understand what she is to do. Most patients will insert a finger or a No. 1 dilator readily under guidance, but this may require considerable firmness on the part of the doctor. It is helpful if she achieves something and is given praise for her attempt before she goes. This gives her a real sense of achievement and increases the rapport between doctor and patient, and usually makes it much easier for her to talk freely about her parental and marital relationships and to relate this to her vaginismus. She can then be sent home to practise by herself (twice daily and using a lubricant) and should be given a definite appointment to return.

When she returns for the next visit, if she has followed instructions, she will be beginning to realize how to relax and how much relaxation helps the introduction of dilator/cap into her vagina. If she can manage this easily, she can then be given dilators of increasing size until she can insert a No. 5 without anxiety or discomfort. When she achieves this she can be told that she is now ready to have relations with her husband. While most patients respond very quickly, there are, of course, those who return with excuses about not feeling well, or being too busy to carry out their instructions. Such patients must be confronted with the fact that they are rationalizing and resisting treatment, and should then be encouraged to achieve a little more under guidance, before being sent home to try harder until the next appointment.

When the patient is ready to resume coitus, it helps to discuss position, to encourage the use of a lubricant, and to make a further appointment for her to come back and report progress. This further appointment gives an opportunity for discussing sexual adjustment. It is most important that patients should realize that the achievement of sexual harmony takes time and practice. They should be encouraged to return for further advice on this problem if they have any difficulties.

Treatment of Hyperaesthesia

There are some women who have such a degree of vulval hyperaesthesia that they resist even touching at the introitus. I find it helpful to explain that of course there is feeling in the vulva and that it shows that she is really very normal. I give a simple analogy to explain that it is she who decides on the nature of the feeling. I ask her to imagine being touched on the bare arm by someone she is very fond of and by someone she dislikes. She will agree that the touch of the first gives her a pleasant feeling and the touch of the second a feeling of loathing and disgust, although the touch has been exactly the same. She is then usually prepared to see that some unpleasant or painful experience—for example, catheterization, enema, or soap-sticks in childhood—has left the association in her mind that any touch is unpleasant. Talking out such experience usually helps her to be co-operative about examination. It is interesting that a few patients are quite happy inserting caps, tampons, etc., for themselves and enjoy sex relations with their husband, but cannot bear to let a doctor touch them; other women can relax well for medical examination but have a horror of doing anything to themselves. Such feelings must, of course, be respected.

I find that this method of treatment at a superficial level, with explanation, reassurance, and suggestion (which plays a large part), can be most effective in a big proportion of cases of vaginismus. Where they do not respond in two or three sessions, however, it is most important to send patients for psychiatric help.

To-day's Drugs

In this column we publish from time to time authoritative notes on a selection of drugs in current use.

Distaquaine V-K (The Distillers Company (Biochemicals) Ltd.).—Phenoxymethyl penicillin as potassium salt in 125-mg. tablets.

V-CIL-K (Eli Lilly and Co. Ltd.).—Phenoxymethyl penicillin as potassium salt in 125-mg. and 250-mg. tablets.

Crystapen V Tablets and Oral Liquid (Glaxo Laboratories Ltd.).—Phenoxymethyl penicillin as potassium salt in 125-mg. and 250-mg. tablets, and as calcium salt in elixir, 62.5 mg. in 60 min. (3.5 ml.).

The tablets of phenoxymethyl penicillin, or penicillin V, contain the potassium salt, which is highly soluble and rapidly absorbed, particularly when taken before a meal; the oral liquid is intended for children and contains the calcium salt, preferred because it has less taste. Penicillin V is the only form of this antibiotic resistant to the destructive action of gastric acid; its discovery has consequently placed oral treatment on a new basis. Absorption is dependable, although apparently not complete, and a dose of 250 mg. (equivalent to 400,000 units) given at intervals of 4 or 6 hours, should have a therapeutic effect not far short of that obtainable with the same dose of "soluble" penicillin (the sodium or potassium salt of benzyl penicillin) given at the same intervals by injection. Larger doses can be given if necessary. If renal excretion is delayed, quite high concentrations can be maintained in the blood by also giving benemid. Such measures have been successful even in the treatment of bacterial endocarditis, though this is an exceptional use. These preparations are chiefly of value as the most convenient means of administering penicillin in ordinary cases of acute infection due to susceptible organisms, such as streptococcal sore throat or otitis media, and pneumococcal pneumonia.

N.H.S. basic price: distaquaine V-K, 100 125-mg. tabs., 40s. 6d.; 100 250-mg. tabs., 80s. V-CIL-K, 100 60-mg. tabs., 19s. 5d.; 100 125-mg. tabs., 40s. 6d.; 100 250-mg. tabs., 80s. Crystapen V, 100 125-mg. tabs., 40s. 6d.; 100 250-mg. tabs., 80s.; 2 fl. oz. oral liquid, 7s. 7d.

Noradrenaline (Carnegie) (Savory and Moore Ltd.).—Noradrenaline has been used since about 1950 to restore the blood pressure in certain types of shock. It is usually given by intravenous infusion of a solution containing 4 mg./litre of L-noradenaline base in 5% dextrose, physiological saline, plasma, plasma substitutes, or blood. The rate of infusion is adjusted to give the best response, which usually requires about 2–4 µg./min. L-Noradrenaline acid tartrate (or bitartrate) is included in the *B.P. 1958*. Noradrenaline (Carnegie) is a solution of this salt which does not differ from other preparations except that it is supplied in a 1-in-10,000 solution ready for immediate intravenous injection in emergencies, as well as the more usual 1-in-1,000 solution (containing 1 mg. base or 2 mg. acid tartrate per ml.), which requires dilution for intravenous use.

N.H.S. basic price: 6 4-ml. ampoules, 8s.; 6 2-ml. ampoules, 5s. 6d.

Lorexane No. 3 (Imperial Chemical Industries Ltd.).—This preparation is in the form of a shampoo which contains lorexane (gammexane). Field trials have indicated it to be a satisfactory treatment for pediculosis capitis and it appears to be non-irritant and free from any secondary or toxic effects. This treatment has the advantage over D.D.T. that it needs to be applied for only a few minutes. As with D.D.T., the treatment has to be repeated a week after the first application.

N.H.S. basic price: 50 g. tube, 2s.

Correspondence

Anorexia Nervosa

SIR,—Dr. E. Williams's review of fifty-three cases of this disorder treated over fifty-six years (*Journal*, July 26, p. 190) combines disarming diligence with a lamentable although possibly innocent tendentiousness. The title was presumably deliberately provocative: it could have no other justification, since every single one of the authorities whom he himself quotes in discussing the aetiology of the condition acknowledges its psychogenic basis. But surely our front as physicians in 1958 is broader and more united than he naively implies.

Sir Russell Brain wrote in May, 1952,[1] "There can hardly be any bodily state which does not to a greater or less extent influence the mind, and there can hardly be any state of mind which does not in turn influence in some degree the functions of the body." This cogent observation might have been regarded as a truth too obvious to require stating were it not so frequently and studiously ignored. Yet it is saddening to encounter such studied ignorance in the context of this paper; so that the author can write, "Psychiatrists . . . have claimed the illness in all its aspects as their own. History-taking has given way to psycho-analysis; physical findings are now ignored; and treatment has been ousted by therapy, either psychotherapy or electric convulsion, or both." What is the justification for this outburst? In no branch of medicine is the importance of history-taking more rightly stressed than in psychiatry: as indeed the author's own hospital's department of psychological medicine would have shown him, had he consulted them. Since when have physical findings been ignored? And what is the difference in meaning between the words "treatment" and "therapy"?

The implication that "somatic medicine" and psychiatry are somehow inherently and intransigently opposed recurs in the proposal "to reclaim anorexia nervosa," which "has strayed from the realm of somatic medicine to the borderlands of psychiatry." The object of this reclamation would seem to be forcible intubation as a routine procedure. The following essentially brief résumé of our own observations on thirteen cases of anorexia nervosa, treated in the York Clinic of Guy's Hospital since 1950 (see Table), when a special follow-up study was begun, may help to restore perspective in this respect.

Analysis of these figures indicates that the average duration of each admission is roughly three and a half months, in which a weight gain of over twenty-two pounds (10.0 kg.) is achieved. When these figures are related to patients, so that patients with more than one admission have their total duration in hospital and their weight gain included under a single heading, the total average time in hospital per patient is five months, and the weight gained over thirty pounds (13.1 kg.). The end-results based on a follow-up one year after final discharge, as indicated in the last column of the table, show that nine of these patients had remained well, six of these nine being entirely without symptoms; one remained a doubtful proposition and contact had been lost with three. However, since readmission is always available to these patients, there is no reason to assume an unfavourable result in the three at present in the untraced category.

This represents a relatively compact series, having a density of nineteen admissions for thirteen patients over eight years, by comparison with Dr. Williams's series, who averaged less than one admission per year over fifty-six years. All our patients received a consistent regime of treatment which included psychotherapy and excluded intubation except as an extreme measure to tide over an otherwise insurmountable and potentially fatal crisis. Our reluctance to resort to tube-feeding is based upon the indisputable fact that it represents an assault on the patient. Indeed, the thinly veiled hostility to these admittedly difficult and exacting patients which can find expression in forcible tube-feeding can never provide a justification for its routine use. Nor is it reassuring to read in Dr. Williams's paper that one of the "obvious advantages" of this procedure is that "because little active co-operation is sought the initial resistance is never as great as to normal feeding, and at this stage the more enfeebled the patient the easier it is in any case to overcome." In fact, as the figures quoted above show, it is very rarely necessary to resort to tube-feeding if good individual contact with the patient, and the confident, accepting, and effective team-work of the nursing staff, is secured. This, after all, is the basis of sound clinical medicine.

Re-reading this letter, I am aware that its tone may suggest anger rather than sorrow; but it is sorrow that I feel. There is so much common ground between the general physician and the psychiatrist in problems of this kind that an emphasis on discord or dissension is above all to be deplored. I respect the sincerity of Dr. Williams's views and welcome the candour of their expression, misguided though I hold them to be. But surely the unifying principle is this: in the study of every kind of illness there exists a basic necessity to resolve any apparent dichotomy between the physiological and psychological approach. For, as clinicians, we are bound to recognize that these approaches can neither be separated in practice, nor can either one of them be neglected, without the patient suffering as a result.

—I am, etc.,

London, E.1. D. STAFFORD-CLARK.

Details of 13 cases of Anorexia Nervosa

Case No.	Age	No. of Admissions	Duration of Admission	Wt. on Admission lb.	Wt. on Admission kg.	Wt. on Discharge lb.	Wt. on Discharge kg.	Wt. Gain lb.	Wt. Gain kg.	Bed Rest	Psychotherapy	Feeding	Follow-up Category	Remarks
1	20	2	2/12	76	34·5	83	37·6	7	3·1	+	+	+	N.K.	Also received mod. insulin. Patient had 6-year interval
			4/12	66	27·2	83	37·6	17	7·7	+	+	+		
2	20	1	2/12	73	33·1	102	46·0	29	13·1	+	+	+	1	Also received mod. insulin
3	27	1	4/12	76	34·5	93	42·1	17	7·7	+	+	+	2	ditto
4	24	3	3/12	67	30·4	94	42·6	27	12·2				1	
			4/12*	75	34·0	73	33·1	−2	0·9	+	+	+		
			3/12	79	35·8	99	44·9	20	9·1		+	+		
5	19	1	4/12	79	35·8	100	45·4	21	9·5	+	+	+	2	
6	23	1	5/12	74	33·6	104	47·2	30	13·1	+	+	+	1	
7	15	1	3/12	64	29·0	112	50·8	48	21·8	+	+	+	2	
8	15	1	2/12	77	34·9	109	49·4	32	14·5	+	+	+	3	
9	15	1	11/52	115	45·8	116	52·6	1	0·4	+	+	+	1	
10	21	1	3/12	99	44·9	116	52·6	17	7·7	+	+	+	N.K.	
11	13	3	3/12	69	31·2	120	54·4	51	23·1	+	+	+		
			3/52	94	42·6	99	44·9	5	2·2	+	+	+	1	Intubation performed under barb. narcosis
			5/12‡	93	42·1	123	55·7	30	13·1	+	+	+		
12	25	2	5/12*†	63	28·5	72	32·7	9	4·0	+	+	+	1	Gap between adm.=5 days at NSU
			2/12	76	34·5	105	47·6	29	13·1		+	+		
13	36	1	3/12	66	27·2	98	44·5	32	14·5	+	+	+	N.K.	

Follow-up Categories. Category 1. Completely well 1 year after final follow-up. Category 2. Remaining well but still complaining of residual symptoms: insufficient to interfere with daily life. Category 3. Still disabled by symptoms. Category 4. (Not required in this series.) Patients who have required readmission to another hospital. Category 5. Indicates death from the disorder.
* Leucotomy performed. † E.C.T. given. ‡ Intubation performed.

REFERENCE

1 Brain, Sir W. Russell, *The Contribution of Medicine to Our Idea of the Mind*, 1952. The Rede Lecture for 1952. University Press, Cambridge.

SIR,—The paper by Dr. E. Williams (*Journal*, July 26, p. 190) on "Anorexia Nervosa: A Somatic Disorder" treats with certain aspects of the problem and ignores others, and as it stands gives, in our opinion, an unbalanced picture. We and our colleagues reported a number of patients with "deliberate disability"[1] and compared their background and behaviour with a group of patients with severe anorexia nervosa, and found a high degree of correspondence. Subsequent studies have reinforced this finding. An important and almost universal factor in the disorder is the conscious deceit by the patient—hiding food, pretending to eat and then getting rid of it. The tricks to which they resort are too numerous to mention here, and we are constantly discovering new ones.

We discussed the psychopathology, and quote, ". . . The theoretical possibility occurred to us that we were dealing with patients who, unlike hysterics, were capable of only limited repression and dissociation. It may be that when, in these people, a certain threshold of mental conflict is exceeded they are driven to a consciously determined symptomatic solution, whether the original motivating situation is consciously appreciated or not." It is because of this conscious deceit that psychotherapy has proved of little value by itself in the more severe cases, but it has been on the rarest occasions that tube feeding has been resorted to and then only as a life-saving measure. We have never needed to use "the threat of reintubation" as a "strong deterrent." Dr. Williams in listing the advantages of intubation states: "Because little active co-operation is sought the initial resistance is never as great as to normal feeding, and at this stage *the more enfeebled the patient the easier it is in any case to overcome*" (our italics). The condition may in part be due to an over-determined masochism, and this process frequently tries to excite a corresponding sadism in the doctor. It would be better to preach a resistance to this impulse than to exhort doctors to indulge it.

The condition is not as rare as Dr. Williams's figures would indicate (49 admissions to the London Hospital from 1897 to 1953). In the same paper we described the results of a postal follow-up on 23 patients admitted between 1938 and 1948 to a teaching hospital similar in size to the London. There are large numbers fulfilling Gull's[2] criteria that are successfully treated by the family doctor, child guidance clinics, psychiatrists, and physicians, and it would be a tragedy indeed if they were all subjected to tube feeding or threatened by it. Other forms of mental illness may be accompanied by anorexia, such as melancholia, schizophrenia, and obsessive-compulsive neurosis, and surely the treatment in these cases would be that of the underlying mental illness. We fail to appreciate Dr. Williams's argument that, because an illness in its most severe form has not yielded to psychiatric treatment, it qualifies for the label of a "somatic disorder." Would a malignant case of melancholia who has not responded to treatment and commits suicide also qualify for this label?—We are, etc.,

M. SIM.
Birmingham, 15. R. W. TIBBETTS.

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[1] Hawkings, J. R., Jones, K. S., Sim, M., and Tibbetts, R. W., *Brit. med. J.*, 1956, **1**, 361.
[2] Gull, W. W., *Trans. clin. Soc. Lond.*, 1874, **7**, 22.

SIR,—I was interested in Dr. E. Williams's article on anorexia nervosa (*Journal*, July 26, p. 190), but surprised that nothing other than intubation and leucotomy were used when the patient refused to take food. In my experience the teachings of Hurst[1] are true, and most of them can be persuaded to take nourishment if sufficient persuasion is applied, although this may entail sitting by the bed for anything up to an hour. If she vomits, the whole manœuvre may have to be repeated again. Nevertheless there are patients, mainly encountered in the severe cases whom one meets in mental hospitals, absolutely unaffected by persuasion. They are obviously psychotic and harbour delusions that the food is poisoned or it is sinful to eat. These respond to capsules of sodium chloride, which create a raging thirst. If a glass of milk is kept continually by the bed, and no water provided, the patient will soon take it in sufficient quantities. Moreover, since prolonged starvation appears to affect the adrenals (as shown by the fine hair which covers such patients), the salt, no doubt, has a beneficial effect on the adrenal metabolism. Those patients who must be intubated should be given injections of insulin after their food and will rapidly put on weight. Although the feed should be of a balanced nature, sufficient carbohydrate is present to make the insulin worth while.

Surely there should be no quarrel regarding psychotherapy and organic treatment. As the patient improves in health she should be investigated and any causal elements discovered. Sometimes the delusions disappear spontaneously, but, in the neurotic type of patients particularly, psychotherapy and the sensible use of sedation and tranquillizers is worth while. Psychiatric observation and, if necessary, prolonged treatment should be continued for a year or two to prevent relapse. Dr. Williams's suggestion that specialized psychotherapy is unnecessary is unwise. No one with any experience would try to analyse a patient who was skin and bone, but as the patient gains weight she may be helped considerably.—I am, etc.,

London, W.1. CLIFFORD ALLEN.

REFERENCE

[1] Hurst, A., *Proc. roy. Soc. Med.*, 1939, **32**, 744.

SIR,—In his article entitled "Anorexia Nervosa: A Somatic Disorder" (*Journal*, July 26, p. 190) Dr. Eirian Williams endeavours to show that this condition should be treated in a general hospital by a physician. However, he does not give any evidence which would indicate that this disease has an organic basis. It is not necessary for a patient to occupy a bed in a general hospital merely for the purpose of intubation. This procedure can be carried out in the acute wards of mental hospitals.—I am, etc.,

Leicester. J. A. DEW-JONES.

Idiopathic Thrombocytopenic Purpura

SIR,—We were interested to read the annotation on the treatment of idiopathic thrombocytopenic purpura (I.T.P.) in your issue of July 26 (p. 216), which deals largely with two papers published by Dameshek and his colleagues.[1 2] These authors claim that approximately 25% of all patients with apparently typical I.T.P. in whom the spleen has been removed will eventually develop disseminated lupus erythematosus (D.L.E.). This is contrary to our own experience.[3] In none of the 42 cases of I.T.P. submitted to splenectomy and followed up for periods of from one to 29 years did the clinical features of D.L.E. develop. This is also our experience in a large series of splenectomies carried out on patients with portal hypertension and haemolytic anaemia. We therefore consulted the two papers by Dameshek and his colleagues, and we find that, although the figure of 25% is given by these authors, they supply no details of the cases and no supporting evidence that splenectomy either caused D.L.E. or hastened its onset.

In the second paper an account of only one patient with "idiopathic" thrombocytopenic purpura is given. A study of this case record makes it clear that the patient had stiffness, limited movement and spindling of the finger-joints, and fever coincidental with the onset of the thrombocytopenic purpura. Accordingly it seems to us likely that a collagen disease was already in being. This is admitted by the authors, who state that ". . . the possibility of a more fundamental disease such as D.L.E. was considered." Whether the severe manifestations of D.L.E. which developed four months after splenectomy were the result of the operation or were due to a spontaneous progression of the disease can only be a matter of conjecture.

Lastly, we agree with Dameshek and his colleagues that steroid therapy should be the first line of treatment in both acute and chronic I.T.P. We do not agree, however,

that splenectomy is potentially dangerous or of little therapeutic value, since none of our cases developed D.L.E., while 75% of our "short history" cases of I.T.P. and 50% of our "long history" cases have remained well for periods which in some cases extend over 12 years.—We are, etc.,

STANLEY DAVIDSON.
A. I. S. MACPHERSON.

Edinburgh, 8.

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Kwashiorkor and Cirrhosis

SIR,—In his pathological study of the liver in kwashiorkor (*Journal*, May 31, p. 1263) Dr. N. K. Chanda states that, "although it may be true that prolonged fatty infiltration leads to cirrhosis, there may be other factors in addition to the fatty infiltration which help the progression to cirrhosis. . . ." There is strong evidence that the cirrhosis described is caused primarily by these "other factors," and not by kwashiorkor. The latter disease is world-wide in distribution, but it seems that cirrhosis is commonly associated with it in only two regions, Jamaica and India.[1] In Jamaica cirrhosis is almost invariably the end-result of veno-occlusive disease of the liver,[2] a disease probably due to poisoning with crotalaria and similar toxic substances. In India the cause of cirrhosis in malnourished children is as yet uncertain, but recent work suggests that veno-occlusive disease of the liver often precedes the cirrhosis.[1]

In South Africa kwashiorkor is very common in African children, but cirrhosis is very rarely seen in them. This hospital, which caters for a population of about half a million Africans, admits 6,000 children up to the age of 9 years annually, of whom 600–800 are advanced cases of kwashiorkor. Most of these cases have marked fatty livers, yet we see only 1–3 examples of cirrhosis of the liver per year. This condition does not appear to be more common in African children, in whom malnutrition is common, than in children of European descent, in whom severe malnutrition is exceedingly rare. During the last 2 years we have seen 5 children with veno-occlusive disease of the liver, 3 of whom were in the second phase of the disease, progressing to cirrhosis. The state of nutrition of the 5 children was rather better than average, and the disease was probably caused by a poison, as in Jamaican patients.

In South Africa cirrhosis of the liver is not caused by the dietetic deficiencies responsible for the pathogenesis of kwashiorkor. In countries where cirrhosis exists in association with kwashiorkor, it may be advisable to look out for toxic factors. As in the cases of senecio-poisoning reported from this country,[3] the noxious agent may be concealed in the faulty diet.—We are, etc.,

E. KAHN.
H. STEIN.

Johannesburg, S. Africa.

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Fatal Haemorrhage from Superficial Veins

SIR,—Mr. W. W. Woodward's letter (*Journal*, July 19, p. 166) recalls to mind a case I saw before the war. A sheep-shearer punctured his left wrist with the shears at about 10.30 a.m. one morning. I saw him two hours later, at which time he was still bleeding fairly briskly from the wound. At various levels on his arm from shoulder to wrist was a series of seven constricting ligatures, five applied as tourniquets by well-meaning amateurs and two applied by the district nurse (alas). The tissues between these ligatures formed a series of bulges, so that the man's arm resembled that of the Michelin tyre man. By removing all the tourniquets and applying a pad and firm bandage at the site of the puncture bleeding ceased and the wound subsequently healed rapidly. The man fortunately escaped a Volkmann's contracture.

The case confirmed very strikingly the *bon mot* of our professor of surgery that the first step in the treatment of haemorrhage is to remove all tourniquets.—I am, etc.,

J. A. WARD.

Cupar, Fife.

SIR,—Although I read with interest the letter from Mr. W. W. Woodward (*Journal*, July 19, p. 166), I did not think that adequate emphasis was laid on the first-aid measures desirable in a patient with heavy venous bleeding. It is true that most bleeding can be controlled by direct pressure to the bleeding point, and this has been emphasized in first-aid books for a number of years. This method of treatment, however, is totally inadequate unless the other basic principles of control of haemorrhage are observed—namely, (1) lay the patient down; (2) raise the limb. These simple actions are apt to be forgotten in an emergency.—I am, etc.,

G. E. DUNKERLEY.

Portsmouth.

Misleading Urine Tests

SIR,—Bottles containing specimens of urine are brought to the G.P. for testing. When using the newer preparations for rapid testing for glucose, mistakes may arise when the bottle contains some contaminants. Two specimens of urine brought to me in this manner on successive days showed marked glycosuria when tested by "testape" and "clinistix." However, both specimens failed to reduce Benedict's solution. Both bottles had contained hydrogen peroxide, and, even though they had been rinsed prior to use, there was sufficient soaked in the screwcap to bring about this misleading result.

Although this must be an uncommon incident, the fact that hydrogen peroxide in a specimen of urine may mimic glycosuria with these rapid tests should be borne in mind to save an occasional patient from unnecessary concern and investigations.—I am, etc.,

ALEC PHILLIPS.

London, E.9.

Indian Lung

SIR,—Too often one hears sad stories of such tropical diseases as trypanosomiasis, malaria, amoebic hepatitis, smallpox, etc., being misdiagnosed in England, even in general hospitals of the highest repute, because they are not thought of. I am wondering whether to this list might not be added Indian lung or tropical eosinophilia (T.E.). Recently I arrived in Malaya (a country new to me) to relieve a friend as M.O. to a group of rubber estates. What I had not realized before coming was that, medically speaking, I might almost as well have gone to south India, about 90% of my patients being Tamils. After a month of it I was thinking: Why all these asthmas? Compared with all previous experience, the incidence seemed fantastically high. Then the penny dropped: of course, T.E.

The Indian population of England has, I understand, been increasing rapidly of late. Many must be going to their local practitioners, who have probably never heard of T.E. and wonder why the response to orthodox treatment of asthma is not good. I would suggest that any practitioner confronted with an Indian with chronic bronchitis or asthma should, if possible, refer him to a consultant in tropical diseases, or look up the literature and treat with "hetrazan" or "banocide," which seem to be the best answer so far.—I am, etc.,

GEORGE L. ALEXANDER.

Perak, Malaya.

Lung Cancer and Tuberculosis

SIR,—Dr. Joseph Berkson states concerning the increase in deaths from lung cancer (*Journal*, July 26, p. 248), "It was noted that this increase . . . was probably related to a decrease in tuberculosis," and urges, "In considering the theory that smoking causes lung cancer . . . available data and opinion which bear against this theory be considered." He quotes a 1925 article: "Are cancer and tuberculosis to be considered as complementary diseases?"

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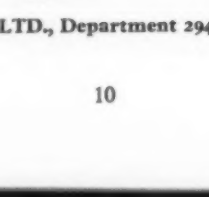

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The incidence of tuberculosis is greater in cities than in the country. If Dr. Berkson's suggestion were correct, the incidence of lung cancer would be lower in cities. Since the incidence of lung cancer has been found to be consistently much higher in cities than in country districts, lung cancer and tuberculosis cannot be complementary diseases. A causative relationship between smoking and lung cancer has been considered as "the most reasonable interpretation of the available evidence" (Medical Research Council statement[1]), but this has never been considered as "proved" (Berkson, ibid.) in this country. To question whether the decrease in tuberculosis is a possible explanation of the increase in lung cancer appears incomparably less reasonable.—I am, etc.,

Enniskillen, Northern Ireland. W. T. WARMINGTON.

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Ectopic Pregnancy after Pelvic Tuberculosis

SIR,—I have read with much interest the letters of Mr. Wilfrid G. Mills (*Journal*, July 19, p. 163) and Mr. Diarmuid O'Driscoll (*Journal*, August 2, p. 326). I would like to draw attention to a paper written by me and entitled "Tubal Pregnancy Complicating Tuberculous Salpingitis" which was published in an Italian journal.[1] In it I described a case of this condition and summarized literature; 46 cases had previously been reported. It was pointed out that in the early stages of tuberculous salpingitis the tubal lumen may remain open, but in advanced cases of tuberculous salpingitis the abdominal ostia were sealed and pregnancy cannot occur. In a study of 136 cases having tuberculous endometritis, I found tubal patency in 33.1%. There is no doubt that the more thorough examination of endometrium in sterility patients within recent years accounts for the knowledge that tuberculous endometritis is much more common than was hitherto suspected. This in turn has led to an increase in the number of cases which may be described under the term unsuspected genital tuberculosis.—I am, etc.,

Glasgow, W.2. ALBERT SHARMAN.

REFERENCE

[1] Sharman, A., *Ann. Obstet. Ginec.*, 1953, **75**, 917.

Jack-knife Position

SIR,—In the report of a paper given at the Annual Meeting of the B.M.A. by Mr. A. J. H. Rains on the surgical treatment of pilonidal sinus (*Journal*, July 26, p. 226) it is stated that the operations were performed in the "jack-knife" position. This position, I know, is of value to the surgical technique, but I would like to point out the serious respiratory embarrassment which may arise in some cases. Most patients for this operation are young and are able to respire adequately, or with slight assistance, in spite of the weight on the diaphragm and the pressure on the chest and abdomen, but occasionally, as I have experienced, one has a patient who is not so young, is obese, and who does not remain a good colour even with assisted respiration through a cuffed tube.

I would suggest that if cyanosis develops the trunk should be raised immediately into the horizontal position. This, I am afraid, was not done in time in a case (which prompts me to write this letter), with the result that the patient exhibited post-operatively the cerebral symptoms associated with a severe hypoxic episode.—I am, etc.,

Taunton. J. L. GRIFFIN.

Reiter's Syndrome

SIR,—Congratulation to Dr. George W. Csonka (*Journal*, May 10, p. 1088) on his valuable study of the natural history of post-urethritic arthritis. Antibiotics have recently abolished the gonococcus, but they have not abolished urethral infection. What we used to call gonococcal arthritis is now replaced by Reiter's syndrome; what we used to believe was a special arthritic predilection of the gonococcus is now seen to be a non-specific quality of all urethral infections.

Reiter's disease is a misnomer, because less than a half of the patients had eye lesions. Its clinical course does not differ from the bewilderingly variable course of rheumatoid disease. Two out of every five cases of arthritis of every kind are precipitated by infections, injuries, operations, and other clearly visible physical causes.[1 2] Ocular manifestations are not peculiar to post-urethritic arthritis but occur in 15% of all cases of polyarthritis.[3] The disease was first described by Hippocrates when he said that young men often got gout after sexual intercourse. Rolleston[4] said that William Musgrave, of Exeter, in 1703 described arthritis after non-venereal urethritis. Lorimer[5] wrote that it was known to John Elliotson. It is just a century since Coulson[6] wrote his masterly description of arthritis following suppuration in the urethra from any cause; he refers to the French writers Velpeau and Civiale.—I am, etc.,

Melbourne. MICHAEL KELLY.

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[6] Coulson, W., ibid., 1858, p. 106.

Driving Under the Influence

SIR,—The studies on the above subject by Dr. John Cohen, Mr. E. J. Dearnley, and Mr. C. E. M. Hansel (*Journal*, June 21, p. 1438) are an interesting contribution to this vexed subject. The following points call for comment. First, the authors do not make it clear whether they regard their trials as a fair indication of what drivers do in practice. The consequences of failure to drive between two sticks on a test ground, and between a wall and an oncoming bus on a crowded highway, are very different indeed. Thus their average sober driver attempts to pass through gaps narrower than his bus in the tests, but would surely seldom attempt this on the road. Secondly, the finding that one or two compensated for the effects of six whiskies by becoming extremely cautious is most important. One driver quoted would not attempt a gap less than 10 inches (25.4 cm.) wider than his bus, even though he thought he would always be able to negotiate a gap 8 inches wider, and in fact did always get through one 7 inches (17.7 cm.) wider. In other words, he gave himself ample margin for safety—3 inches (7.6 cm.) wider than his performance. Compare the average sober driver, who would attempt gaps narrower than the bus, thought he could always manage gaps 1.3 inches (3.7 cm.) wider, and in fact could only always succeed with gaps 6.7 inches (16.4 cm.) wider. Hence the compensating drunk would only attempt gaps he could easily pass, the sober ones would attempt gaps at which they often failed. If the trials mean anything, the drunk driver was much safer than the average sober one.

Unfortunately the authors do not show how many drivers took part in their trials, so we do not know what percentage are capable of this very desirable compensation. The following article (p. 1442) by Dr. H. J. Walls is helpful. In his series he found that there were 116 drunk drivers involved in accidents and 91 drunk but not involved. Also that the urine alcohols were significantly higher in those not involved. Evidently some of the latter were compensating by extreme caution, and therefore driving more safely than sober drivers do, and unlucky to be arrested.

The above paragraphs depend on acceptance of the authors' statement that some drivers compensated by becoming cautious. Evidence that the individual drunk drivers were also tested when sober is not given, so we do not know that the extremely cautious ones are not even more extremely cautious when sober. Unless this check is made, one cannot say whether alcohol makes all drivers less safe, or whether it makes some more safe, others less safe, and

little difference to still others. It is suggested that the latter is more likely. If so, the law needs re-examining. Drivers involved in accidents when drunk should be punished much more severely, and drivers not involved in accidents should be left alone, whatever their alcohol status. It would be an interesting experiment.—I am, etc.,

Claremont, West Australia. B. C. BIGNOLD.

To-day's Drugs

SIR,—In the section "Ilotycin" in "To-day's Drugs" in the *Journal* of August 2 (p. 324) the writer states that erythromycin is best restricted to cases in which staphylococcal infection has not already responded to penicillin in full doses. I contend that, although this is a good rule, there are important exceptions to it. For instance, with an infection of a lactating breast or with large boils treatment should be by penicillin and erythromycin given together, and without delay, the reasons being: (1) these infections are nearly always due to *Staph. aureus*; (2) the *Staph. aureus* is so often resistant to penicillin that to await a response on penicillin alone risks unjustifiably prolonging illness. Furthermore, I see no reason why this treatment should not be given in general practice.—I am, etc.,

London, N.16. RICHARD F. PEARSON.

Broadmoor Patients

SIR,—Your "Expert in Forensic Psychiatry" (*Journal*, July 19, p. 174) indicates that approximately 200 Broadmoor patients are being treated in mental hospitals. While he outlines the general conditions governing their treatment, he appears to omit one specific problem, and I would welcome the opportunity to mention this.

If a patient comes into the Broadmoor class in an ordinary mental hospital he then becomes subject to special arrangements which are outlined in Circular 700 of the Board of Control, dated October, 1927. This circular expressly instructs that extramural parole is not to be granted "in the same manner as non-criminal lunatics." In fact, "no criminal lunatic . . . shall be allowed to leave the institution without the authority of the Secretary of State." This means that important aspects in the treatment (as opposed to detention) of the patient are removed from the doctor in charge of that patient and vested in certain officials in the Home Office. When in doubt these officials may have the advantage of medical advice, but most usually only on the documents and not the patient. In practice, for a patient to be granted privileges—either village parole or home leave—special application must be made to the Home Office. In the past there have been considerable delays in obtaining replies to letters from the Home Office. The replies to recent requests, however, have also contained two rather disturbing departures from modern psychiatric practice. First, in two cases where village parole was requested, it was suggested that the patient should be in the care of a responsible person (in one a nurse, in the other a nurse or patient). This, of course, is the antithesis of parole ("a word of honour"). The second departure is the view that frequent home leave should not be granted, as this would lead the patient to anticipate discharge.

It should be realized that the mental hospitals are constantly concerned with "the safety of the public" (which is the object of Circular 700), as our certified patients are already detained for their own protection or the protection of others. If there are other issues than the illness involved in the public safety, then the patient should be—and already is, it appears—treated actually at Broadmoor. The patients we have, at an ordinary mental hospital, have been deemed suitable by the Secretary of State and acceptable by the hospital management committee. There is no real reason for their control from afar, and, indeed, this control is not only ill-informed but often fatuous. The public's safety is most certainly at issue when a patient is granted ground parole, because escape from the hospital is child's play compared with that from the ward. Yet the Secretary of State seeks no discretion in the granting of ground parole. Secondly, the patient's treatment should be flexible and in line with his circumstances. If he is well we should encourage him. Many patients accept that they are subject to recurrences. This is no reason to restrict them while they are well. Finally, the law is so full of tricks of fortune that it is unfair to penalize the handful of Queen's pleasure cases who were found "insane on arraignment."

First of all, "insane on arraignment" means that the patient was never found guilty of any offence and therefore technically is not a criminal. Yet if he remains mentally sick he may never be granted the privileges of his ward mates, for detention in the Broadmoor status during Her Majesty's pleasure is indefinite. The criminal charges in these cases can be relatively minor, e.g., larceny. It would thus even pay an innocent lunatic to be found guilty, as sentence limits the duration of the Broadmoor status to the period of imprisonment imposed: perhaps to a few years.

Finally, in such cases, even though the charge be the same, if the case is dealt with in the lower court ordinary certification or a sentence is all that can result, while if the patient elects to go for trial he may be detained under the disadvantages I have outlined for life. It is obvious that even stricter control of Broadmoor patients may be in view because of recent events. I would suggest that the facts call for relaxation and the withdrawal of Circular 700 as far as the mental hospital Broadmoor patient is concerned.—I am, etc.,

Wickford, Essex. ASHLEY A. ROBIN.

Patients in Mental Hospitals

SIR,—Your leading article (*Journal*, August 2, p. 295) on the above subject is both timely and welcome. You rightly point out that the various percentages given in the Birmingham survey would not be applicable to other parts of the country, and I am sure that the vast majority of doctors working in mental hospitals would heartily endorse your recognition of the vital psychotherapeutic value of the psychiatric nurse. Permit me to make some comments on an item which is still being debated—i.e., the transfer of long-stay patients to units divorced from the mental hospital service. Unless such units will be staffed by psychiatrists, trained mental nurses, and social workers, is there not a danger of patients being conveyed to a sort of custodial care, where they will live in an institutionalized manner? Do we know enough about the "chronic patient" to be sure when there is no longer any hope of rehabilitation with a mental hospital therapeutic programme? Surely the modern attitude is that no long-stay patient, unless he suffers from dementia due to organic changes, is beyond hope. Like many other mental hospitals, Park Prewett has been making increasing efforts to rehabilitate the long-stay patient, and to this end a rehabilitation unit was organized in 1955 with the help of a research grant from the South-west Metropolitan Regional Hospital Board. During the calendar years 1956 and 1957, sixteen male and seven female patients were successfully rehabilitated from this unit—i.e., they are pursuing a gainful occupation and are living in an independent fashion, outside of the hospital. Their total hospitalization (continuous in each instance) was over 202 years, varying from 2 years 2 months to 28 years 5 months. These patients, most of them "burnt out" schizophrenics, were fairly well behaved and might have been transferred to some separated unit, but I fear they would have spent the rest of their lives there. In the unit of the mental hospital they received the concentrated attentions of psychiatrists, mental nurses, social worker, occupational therapist, and disablement resettlement officer. I would submit, Sir, that until we know more about the long-stay patient and the possibilities of his rehabilitation, the mental hospital should continue in its efforts, including the therapeutic force of "a therapeutic community," which you quote.—I am, etc.,

Basingstoke, Hants. I. ATKIN.

Ergometrine with Hyaluronidase

SIR,—The paper by Mr. M. P. Embrey and Mr. W. J. Garrett (*Journal*, July 19, p. 138) very prettily illustrates the effect on contractility of the human puerperal uterus of adding hyaluronidase to an intramuscular injection of ergometrine. The sensitivity of the uterus to ergometrine, however, is at its zenith during labour.[1] For those interested in

the technique utilizing ergometrine and hyaluronidase intramuscularly for the prevention of post-partum haemorrhage, a similar study carried out on the parturient uterus, either late in the second or in the third stage of labour, would therefore have been of particular interest.

Behaviour of the puerperal uterus when exposed to the action of ergometrine might conceivably constitute a pointer to what may happen in the final phase of labour. But, with great respect, the authors have no valid grounds for coming to the conclusion set out in the summary of their paper. Some recent large-scale clinical trials[2,3] give convincing evidence to the contrary.—I am, etc.,

London, S.E.18. E. G. JONAS.

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British Qualifications Abroad

SIR,—Dr. I. M. Griffith (*Journal*, May 10, p. 1124) calls for a serious review of the value of the L.M.S.S.A. and the M.R.C.S., L.R.C.P. qualifications. He bases his suggestion on the fact that in some of the states in the United States which accept foreign doctors these British qualifications are not recognized.

In Britain very few foreign qualifications are recognized, but that does not mean we should call for a review of such foreign qualifications. The L.M.S.S.A. and Conjoint qualifications offer wonderful opportunities for doctors with foreign qualifications who wish to register in Britain and cannot go through the full university course.

British-qualified doctors are not, I am sure, being primarily trained for the foreign market.—I am, etc.,

Ibadan, Nigeria. E. A. B. ADENUGA.

Treatment of Boils

SIR,—As a comment on the article on the treatment of boils with erythromycin and with antibiotic E 129 by Dr. Allene Scott and Miss Pamela M. Waterworth (*Journal*, July 12, p. 83), I would point out that it costs just over £210 to treat 55 patients with boils for seven days with erythromycin at the dosage stipulated (each gramme of erythromycin costs approximately 11s.). It may cost even more to treat them with antibiotic E 129 when this is finally purified (Glaxo Laboratories, Ltd., could not give me even an approximate cost). On the other hand treating 55 cases of boils for seven days with intramuscular crystalline penicillin (one million units daily) costs just over £4 10s. (each phial, including the sterile water, costs 1s. 8d.), and this appears to cure perfectly adequately the large number of boils one sees in general practice.

Of the 23% of boils in the series which were caused by penicillin-resistant staphylococci only a small fraction of these would not respond to penicillin, for how often one finds that the organism resistant *in vitro* responds very readily *in vivo*. For this small fraction other antibiotics are indicated. I am convinced, therefore, that, with present-day drug costs, boils meriting antibiotic treatment should receive penicillin in the first place until both progress and sensitivity indicate a more drastic and more expensive method of therapy—this at the risk of causing a tiny number of post-necrotic scars many of which will be above the nuchal hair-line, in the axillae, or in other unseen areas.—I am, etc.,

Brampton, Cumberland. G. N. MARSH.

Suppurative Arthritis Complicating Rheumatoid Arthritis

SIR,—Professor J. H. Kellgren and his colleagues (*Journal*, May 24, p. 1193) have done a service by describing the serious and not altogether rare complications of suppuration in joints and other sites, arising apparently spontaneously in patients suffering from rheumatoid arthritis. In addition to the references they have quoted, occasional examples of suppurative complications have been described in pathological studies of rheumatoid arthritis—e.g., Sokoloff and Gleason,[1] who described two such cases, and Fingerman and Andrus,[2] who found pneumonia in 39 instances and septicaemia in seven, in necropsy studies on 59 rheumatoid subjects. However, until the report by Professor Kellgren and his colleagues the clinical significance and the frequency of these suppurative complications had not been appreciated.

The case histories described make it clear that immobilization and pressure sores could not have been precipitating or contributory factors in all instances. Nor could local or systemic steroid therapy be indicted, as, although the patient described by Dr. T. G. L. Allum (*Journal*, June 21, p. 1479) had received treatment with prednisone, mention of steroid therapy is made in only six of the 13 patients described by Professor Kellgren and his colleagues. It would appear possible that tissues damaged by the rheumatoid inflammatory process may be unduly susceptible to bacterial infections. I should briefly mention the case of a male patient, a foreman craft worker, aged 49 years, who had suffered from rheumatoid polyarthritis for two and a half years. He remained ambulant and at work, receiving treatment with aspirin and physiotherapy alone. He developed a patch of eczema over the left ankle, with some small infected skin lesions. These healed with local treatment, but five months later the patient presented with phlebitis of the left calf, and within a few weeks developed suppurative arthritis of the left knee. It is possible that the small infected skin lesions represented the portal of entry of the organisms in this patient.

In view of the known dangers of steroid therapy in masking the signs while permitting the spread of bacterial infections, it is clear that additional vigilance is required with regard to the diagnosis of secondary infections in rheumatoid patients receiving steroid therapy. It would be doubly unfortunate if steroids were administered, locally or systemically, to a rheumatoid patient in whom suppurative complications were unrecognized, as not only would steroid therapy be unfairly incriminated as a precipitating factor, but the consequences of the administration of steroids to such patients could be disastrous. One point of clinical importance emerges: whenever possible preliminary aspiration of a rheumatoid joint should be performed prior to the intra-articular injection of a steroid preparation.—I am, etc.,

Newcastle upon Tyne, 1. MALCOLM THOMPSON.

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1 Sokoloff, L., and Gleason, I. O., *Amer. J. clin. Path.*, 1954, **24**, 406.
2 Fingerman, D. L., and Andrus, F. C., *Ann. rheum. Dis.*, 1943, **3**, 168.

Hydrocortisone for Herpes Labialis

SIR,—After reading the article by Drs. S. C. Truelove and R. M. Morris-Owen on the use of hydrocortisone tablets for "dyspeptic" ulcers of the mouth (*Journal*, March 15, p. 603), I have been trying 1% hydrocortisone skin lotion in cases of "cold" of the lip. In the three cases treated (all early), swelling and discomfort has gone in 48 hours.—I am, etc.,

Woodbridge, Suffolk. H. R. ODLUM.

Duodenal Ulcer

SIR,—During a discussion on duodenal ulcer at the recent B.M.A. Annual Meeting at Birmingham I drew attention to some experiments I did many years ago[1,2] in an attempt to elucidate the aetiology of duodenal ulcer, believing then, as I do now, that a rational treatment of duodenal ulcer can be based only on a knowledge of its aetiology. I showed, firstly, that the products of bacterial decomposition of cellular tissues such as liver or muscle inhibited the flow of saliva and of pancreatic juice (induced by the synchronous

injection of secretin). I then showed that simple tying of the pancreatic duct in the dog led to the production of duodenal ulcers. One could not help feeling that in man duodenal ulcers of various types might have a varying aetiology, but with inhibition of the secretion of pancreatic juice as an underlying cause and with varying degrees of superimposed sepsis leading to the gross excavating types. With the great number of bright young men doing medical and surgical research I would like to see this problem fairly attacked. The gross mutilations which many surgeons undertake hardly seem rational treatment. Surely there must be a better way of preventing unneutralized hydrochloric acid attacking the duodenum.—I am, etc.,

Melbourne, Australia. J. LEON JONA.

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[1] Jona, J. Leon, *Med. J. Aust.*, 1918, **1**, 165.
[2] —— ibid., 1919, **1**, 316.

Imbecile Children

SIR,—I was interested in Dr. John Burkinshaw's letter concerning imbecile children (*Journal*, June 28, p. 1543), but disagree with his view that all imbeciles should eventually be placed in institutions. The development of training schools would allow many of these children to be cared for at home. It is also possible that ways could be found of temporarily boarding these children in connexion with these training schools so that their parents could take a holiday.

The institution, however good, can never provide the individual care and affection found in the home. When a child goes to an institution, the parents' greatest concern is that the child will not get sufficient individual care and affection. Community training schools with facilities for boarding, I believe, will in the end provide the best practical answer to the problem of the severely retarded child. If the case is a hopeless one and it is impossible for the child to adapt itself to any group, this becomes apparent after a while in a training school. The parents are then much less anxious under these circumstances when admission to an institution is suggested.

In the training school here in Rochester, N.Y., a large number of volunteers, made up largely of parents, are responsible for seeing that the children get individual care and affection. Some kind of "half-way house," connected with the community training school and working in conjunction with the local institution, would probably solve the problem of temporarily caring for a child in the community. Tizard and many other experienced psychologists working at the Fountain Hospital and elsewhere believe that many more severely retarded children can be trained to live in the community. In conclusion, I would like to say that my feeling is that the responsibility for helping the family which has an imbecile child should be accepted by the local community where it rightfully belongs.—I am, etc.,

Rochester, 20, New York. R. D. BROOKE WILLIAMS.

Beds for the Aged

SIR,—I think Dr. Arnold B. Cowan in his letter (*Journal*, August 2, p. 325), should be congratulated on drawing the attention of the medical public once again to the "appalling conditions under which the average pensioner lives and dies." I think probably all general practitioners are well aware of the need for further beds for the geriatric patients, and if such beds are becoming empty in sanatoria it does seem rather incredible they should not be put to use for the care of the elderly.

Very recently a doctor came round the geriatric units in this area who had come specially from South Africa to ascertain how some 5,000 redundant tuberculosis beds could best be turned over to the care of the elderly. Surely if such a policy can be adopted in South Africa there is every reason to think it can be adopted here. Or are we just backward after all and just a little decadent?—I am, etc.,

Wolverhampton. KENNETH HAZELL.

Obituary

A. A. E. NEWTH, O.B.E., M.B., B.S., L.M.S.S.A. D.P.H.

Dr. A. A. E. Newth, a former principal school medical officer to the City of Nottingham, died on July 30 at the age of 70.

Alfred Arthur Edmund Newth was born in Sussex on September 17, 1887, his father being a general practitioner at Haywards Heath. Educated at Epsom College and the Westminster Hospital, he qualified L.M.S.S.A. in 1911 and graduated M.B., B.S. in the following year. After holding house appointments at the Westminster Hospital, the Wolverhampton General Hospital, and the Derbyshire Royal Infirmary, he was appointed assistant school medical officer in Nottingham in 1914, and continued in the service of that education authority until his retirement in 1954.

During the first world war he served in the R.A.M.C. In 1923 he took the D.P.H. of Oxford University, and shortly afterwards he was appointed senior school medical officer in Nottingham. An honorary fellow of the Society of Medical Officers of Health, he was a former president of the Nottingham Medico-Chirurgical Society, and at the Annual Meeting of the B.M.A. in Harrogate in 1949 he was vice-president of the Section of Child Health. After retiring from the school health service he accepted an invitation to become a medical officer at the Mapperley Hospital, Nottingham.

Dr. Newth married Gwendolyn Glendinning Davis, herself a doctor, and she survives him.

R. G. S. writes: Dr. Newth was one of those with a naturally and persistently inquiring mind. If he felt that something needed investigating he would go to no end of trouble to complete the inquiries. His personal typist would often find herself involved in a questionary which had to go to many authorities or to experts on the subject. I well remember the interest he took in the question of physical examination prior to schoolboy boxing contests. He felt this was a waste of time, or, if it was not, then all youngsters prior to any activity involving hard physical work should have a physical check-up, and so where would it all end? In 1943 he revived the School Health Service Group of the Society of Medical Officers of Health, a group which was then almost non-existent, and became secretary, a post he retained until 1957. His especial interest was in "handicapped pupils," and in 1945 he was appointed by the Minister of Education to serve on the Advisory Committee on Handicapped Pupils. He realized that maladjustment was something which could be present in a child, and this encouraged him in 1937 to visit and inquire into the work of such child guidance clinics as were then established and finally to persuade his authority in 1938 that one was necessary in Nottingham. In 1952 he was awarded the O.B.E., an honour he well deserved, for he had made himself one of the experts in the work of the school health service.

In 1949, faced with the choice of operation or deep *x*-ray therapy, he chose the latter, facing the issue with that patient fortitude which was a part of his nature. On recovery he came back to his office, and that was the end of it so far as he was concerned. When he retired in 1954 (the education committee had shown what they felt about him by retaining him for quite a period beyond the usual retiring age) he could not sit back and take life easily, but went as a senior hospital medical officer to the local mental hospital, where he felt he could still give something to the patients there, who quickly came to know him and to look to him for that cheerful encouragement which is so essential in that type of work.

H. M. C. writes: Dr. Newth early became an authority on the subject of school health, his work in child guidance being outstanding. His great knowledge of his chosen

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REFERENCES:
Nature 1958, *181*, 1397; *Nature* 1958, *181*, 1717; *Lancet* 1958, *ii*, 6.

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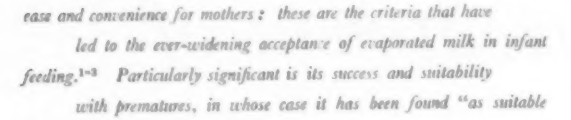
1 ARCH. DIS. CHILD., 14, 80, 1939
2 BIRM. MED. REVIEW No. 5, 1950
3 MED. OFF., 2290, 1952
4 LANCET I, 697, 1949



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subject was always at the disposal of his colleagues, and his opinion was also eagerly sought in official quarters. Among the innumerable committees which sought his attention, membership of the medical advisory committee of the British Council for the Welfare of Spastics claimed his special regard. He was in much demand as a speaker, and took part, for example, in annual conferences of the British Medical Association and the Royal Society of Health. An able and prolific writer, in addition to many articles in the medical press he contributed the chapter on the school health services in *Modern Trends in Public Health* (1949). Dr. Newth's successful effort, however, in resuscitating the School Health Service Group of the Society of Medical Officers of Health in 1943 will remain his memorial. He took on the duties of secretary and did yeoman work to enhance the authority and prestige of the group. He was untiring in his endeavours, and his preparation of the papers for the meetings of the group was an indication of his energy and acumen. He had an excellent and well-stored brain, and although he was meticulous in details the memoranda which he prepared for guidance had a lively style. He continued as secretary up to a few years ago with one break—when the group insisted he should serve as their president. He held this office with dignity. So much did his colleagues feel over his efforts for the group that a special dinner was held in his honour, when tributes of the most glowing kind were paid to him, and a token of their regard, to which very many colleagues over the country had contributed, was presented to him. As usual, his reply was modest and unassuming. It is good to know that he has left behind him an enthusiastic and active group. Dr. Newth's valuable help to the council of the Society of Medical Officers of Health was recognized by his election to the much-coveted distinction of honorary fellow. Locally he was held in high esteem by the medical practitioners, and this resulted in his election as president of the Nottingham Medico-chirurgical Society. His appointment as O.B.E. was very well received by a wide circle. His interests were not exclusively confined to the subject of school health: he played an excellent game of golf, and I recall with pleasure his expert comments during our visits to Twickenham. He was also a skilled craftsman. In spite of his profound knowledge and erudition Dr. Newth was by no means the dull administrator. His happy conduct of the School Health Service Group will be remembered for his unfailing good humour, tact, and pleasant chuckle. He was a *bon viveur*, and his colleagues much enjoyed his company on social occasions. In all he will be greatly missed by his associates, who will be grateful for having known him. The funeral service was held at St. Jude's Church, Nottingham, when very many friends, including a group of nurses from the Mapperley Hospital, attended to show the affection and high regard in which he was held.

J. B. BISHOP, T.D., B.M., B.Ch.

Dr. J. B. Bishop, deputy superintendent of Broadmoor Institution, died at his home on Broadmoor Estate on August 4. He was 50 years of age.

John Brock Bishop was born on June 2, 1908. He was a scholar at the Merchant Taylors' School and later an exhibitioner at St. John's College, Oxford, where he gained second-class honours in physiology. His clinical work was done at St. Thomas's Hospital. After graduating B.M., B.Ch. in 1931, he held the posts of casualty officer and house-physician to Sir Henry Tidy at St. Thomas's Hospital. Later he was a clinical assistant at the West End Hospital for Nervous Disorders and house-physician at the Victoria Hospital for Children. Having joined the Territorials in 1935, Bishop remained a keen member of that force until his transfer to the Army Emergency Reserve. He went to his last camp only a few weeks ago. Until 1939 he was in private practice in Chelsea. During the war he served in the R.A.M.C. both at home and overseas in North Africa and Italy. He was mentioned in dispatches and gained the Territorial Decoration with three clasps. After the war he continued to serve in a hospital ship.

V. G. S. writes: In 1948 Dr. Bishop joined the staff of Broadmoor, where he worked first as a medical officer and later as deputy superintendent. From the outset he regarded this sphere as his life's work. For two years he sustained practically the whole administration of the institution during the protracted illness of the late Dr. S. G. James, then medical superintendent. For some years Dr. Bishop was handicapped by a neurological condition which with his characteristic tenacity he forbade to interfere with his everyday life and work. Eighteen months ago he underwent a major operation which added further to his physical burden. But a week before his death, and only twenty-four hours before he had to take to his bed, he was present at the Broadmoor Staff Club's horticultural show and made one of those speeches which were always so apt and for which he had a justified reputation. His main interest professionally was not in the science but in the art of medicine and its social applications. The organization at Broadmoor gave him wide scope for his particular type of work, and his practical common sense was an invaluable asset in such an institution. In all his work for the patients he enjoyed the active interest and support of his mother. Dr. Bishop was a bachelor. His cheerily shouted "Hullo" used to echo round the blocks as he made his daily visits. Staff and patients alike have lost a real friend, but retain memories which are a pride and inspiration. For the last twelve months of his life Bishop held the posts of Master of the Worshipful Company of Girdlers and Renter Warden of the Worshipful Company of Inn Holders. The former office was held by his father thirty years earlier. Bishop's term of office ended only a few days before his death, when he was already confined to bed. Having accepted that he could not possibly be present in person to hand over to his successor, he made all the necessary arrangements by telephone—fully aware of his own situation but not yielding to his weakness. In all the many social activities he enjoyed he always gave of his conscientious best. He held the office of churchwarden at Crowthorne Parish Church. His wide circle of friends outside Broadmoor admired his courageous bearing. To his close relatives, especially his mother, we extend our deepest sympathy and at the same time thank God upon every remembrance of her son.

J. L. SHELLSHEAR, D.S.O., M.D., M.S.

Professor J. L. Shellshear, who died at Sydney, New South Wales, on March 22, at the age of 72, was one of the notable figures in the medical faculty of the University of Hong Kong in the period between the two world wars. After having been professor of anatomy there he became research professor in the department of anatomy in the University of Sydney.

Joseph Lexden Shellshear was born at Sydney on July 31, 1885, the son of a civil engineer, and studied medicine at the University of Sydney, where he was a Renwick scholar, and graduated M.B., Ch.M., with second-class honours, in 1907. He was granted the degree of M.S. of the University of Adelaide in 1926, and three years later proceeded to the Sydney M.D. with a thesis on a study of the arteries of the brain of the spiny anteater (*Echidna aculeata*). After graduation he set up in practice in Albury, on the Victorian border, and quickly built up a reputation for himself in the community as a whole as well as in the profession. He took a particular interest, and was very active, in the militia, serving as a gunner officer, so that on the outbreak of the first world war he joined the Australian Imperial Forces as soon as his militia duties would permit. He went overseas in 1915 and eventually commanded a battery of the 4th Australian Field Artillery Brigade in France. During his war service he was twice mentioned in dispatches, and was awarded the D.S.O. in 1918.

Shellshear was not a man who wasted opportunities, so at the end of the war he was able to achieve another of his ambitions—namely, to embark on postgraduate study in anatomy. In 1920–1, with the help of a Rockefeller fellowship, he was able to visit the United States, and thereafter he was appointed senior demonstrator in the department of anatomy at University College, London. There he put in two very fruitful years with Professor (later Sir Grafton) Elliot Smith, laying the foundation for the work he was to do later in Hong Kong in prehistory and on the blood supply of the cortex of the Chinese brain. In 1923 he was appointed to the chair of anatomy in the University of Hong Kong, a post which he held till his resignation in 1936. During this period he was twice elected dean of the medical faculty, but his heart was really in his department with his students and his original work. In the field, his prehistory work with Dr. C. M. Heanley and that of Mr. Schofield, followed by Father Finn, S.J., laid the foundation for the investigations by the university which are being pursued with such zest and success at the present time.

Professor Shellshear was honorary secretary of the Hong Kong and China Branch of the British Medical Association from 1923 to 1925, and president in 1929 to 1930. On his retirement from Hong Kong he returned to Sydney, but did not retire from work. At the university there he continued for some years his anthropological studies as a research professor in the department of anatomy from 1937 to 1948, and on the medical side kept up his anatomical interests by joining his brother, Dr. K. E. Shellshear, in his radiological practice in the city. He was competent in many fields, but it will be for his infectious keenness in his department that he will be remembered with gratitude by generations of Chinese students in Hong Kong.

He leaves a widow, who was a very valuable helpmate to him throughout the whole of his career.—L. T. R.

H. D. LEVICK, M.B., F.R.C.S.

Mr. H. D. Levick, honorary consulting surgeon to the North Ormesby Hospital, Middlesbrough, died at his home at Middlesbrough on July 23. He was 91 years of age.

Harry Driffield Levick was born on November 13, 1866. He received his medical training at St. Thomas's Hospital, and qualified by taking the London Conjoint diploma in 1891. He graduated M.B. from London University in 1893, and two years later obtained the B.S. degree and admission to the F.R.C.S. After qualification he held the appointments of junior obstetric house-physician at St. Thomas's Hospital and house-physician at the General Lying-in Hospital, Lambeth. Following a period as ship surgeon, he held a number of other hospital appointments, including those of clinical assistant and assistant medical officer at the Whitechapel Infirmary, house-surgeon at the Seamen's Infirmary, Ramsgate, and house-surgeon and senior resident medical officer at the Royal Free Hospital. In the late 'nineties he settled in general practice at Middlesbrough, and became surgeon to the North Ormesby Hospital. He soon established a surgical practice and his own nursing-home and consequently gave up general practice. For some time he was consulting surgeon to the Guisborough General Hospital and honorary surgeon to the Adela Shaw Orthopaedic Hospital, Kirby Moorside, York. A member of the British Medical Association for nearly 50 years, he was chairman of the Cleveland Division in 1915. He leaves a widow, Dr. H. Minnie Levick.

J. E. H. writes: Harry Levick had an exceedingly full, active, and happy life. To-day it seems strange to have known anyone intimately who did the first abdominal operation in Middlesbrough and the first amputation without "laudable pus." He was a most able surgeon, with a vast experience and a very fast technique, achieved largely by his being completely ambidextrous. He was honorary consulting surgeon to the North Ormesby Hospital for 32 years, and his services were in demand over a large area of the North Riding of Yorkshire. Mr. Levick was surgical specialist to a casualty clearing station in the first world war. When he returned to civilian life in 1918 he was appointed a justice of the peace for Middlesbrough. He served for 23 years on the town council and was mayor in its centenary year. As a councillor he was years ahead of his time in his policy of housing the tuberculous on open estates and in smoke abatement by allowing only one open fireplace per house. He was a president of the British Legion and a past master of the local lodge of freemasons. He took a great interest in the Boy Scout movement and gave the local scouts a headquarters. It may well be wondered how he found time for so many activities, but he had a very quick, shrewd mind and a happy wit, which made him a charming companion. The leisure he had was used for shooting, golf, tennis, and salmon fishing, at all of which he was much more than proficient. Throughout his whole career all his associates were very conscious of the help and companionship he had from his wife, Dr. Minnie Levick, who survives him, and to whom there is such great sympathy now that they are parted on the eve of the diamond jubilee anniversary of their wedding.

L. F. K. WAY, D.S.O., M.R.C.S., L.R.C.P.

Lieutenant-Colonel L. F. K. Way died suddenly at Pyle, Chale, Isle of Wight, on July 15. He was 73 years of age.

Leslie Ferguson Kennedy Way was born at Pyle on April 20, 1885, and was educated at the Isle of Wight College. After qualifying at St. Bartholomew's Hospital in 1910, he joined the R.A.M.C. in the following year, serving throughout the first world war, in South Africa, on the Western Front, and at Gallipoli. He was awarded the D.S.O. in 1918 while in command of the 101st Field Ambulance in France, and was also mentioned in dispatches. In 1919–20 he was specialist in venereology and skin diseases in the Eastern Command. From 1921, when he retired from the R.A.M.C., until 1933, he was in general practice at Burgess Hill, Sussex, becoming also surgeon at the King Edward VII Memorial Eliot Hospital, Haywards Heath. From 1933 to 1936 he was in practice at East Ham, and thenceforward, until his death, in the Isle of Wight. Recalled to the R.A.M.C. during the second world war, he served as assistant director of medical services in the Southern Command from 1939 to 1942, and for the latter period of the war as senior medical officer, Isle of Wight. In 1952 he was chairman of the Isle of Wight Division of the British Medical Association. While a student at St. Bartholomew's he was captain of the hospital's athletics team in 1907, and of the United Hospitals team in the following year. In 1911 he married Miss Gladys E. M. Pixell, who died in 1918; his marriage to Mrs. Margaret A. Watson in 1920 was dissolved in 1933; and in 1936 he married Miss K. M. Nurse. He leaves a widow, two sons, and three daughters.

G. M. H. writes: Few practitioners of this generation will have had the opportunity to work with one of the "old school" dispensing country doctors. It has been my good fortune to work with the late Colonel Leslie Way over the past two and a half years and to observe his deftness in the art of dispensing. He made it appear so simple and derived a real pleasure in selecting the right prescription for the case in hand, for he had a wealth of knowledge from which to draw. His dispensary was his work-bench, and he would visit it day and night. For a newly appointed assistant to be shown round the country where Leslie Way was born and bred, and where his ancestors had lived and farmed for over 200 years, was an experience to remember. Each hamlet held a story handed down from previous generations; each chine, tales of smuggling or wrecks; tales of rescue work along the coast, and of the lifeboat crews he remembered from his youth, many of whom had perished. It was a history he was proud to relate. This.

then, is the country practitioner whom I shall remember, with his love for humanity and his zest for life, undiminished by advancing years. His modesty in achievement and courage in adversity were perhaps Leslie Way's greatest assets. His was a fuller world than most, and I was privileged to share it.

P. BANBURY, M.R.C.S., L.R.C.P., D.P.M.

Dr. Percy Banbury, formerly medical superintendent of St. Clement's Hospital, Ipswich, died at his home at Ipswich on July 18, aged 65.

Percy Banbury was born in London on January 17, 1893, and was a medical student at St. Thomas's Hospital. He was in his final year when the first world war broke out. He immediately joined the Royal Navy as a probationer surgeon lieutenant and was at sea for some time—mostly in little ships. After being called back in order to qualify he returned to sea and remained in the Navy until 1920. During his service he did a considerable amount of psychiatric work, and on his release determined to specialize in this type of medicine. His first appointment was to the Crichton Royal at Dumfries, where he remained for three years. Later he worked in the mental hospital service of the London County Council, obtaining the D.P.M. in 1927. In 1930 he went to Ipswich as medical superintendent of the then Ipswich Mental Hospital and remained there until ill-health forced his premature retirement in 1953.

P. W. writes: Banbury was definitely a personality—but a very human one. Somewhat of an autocrat, he was an able and far-sighted administrator and ran his hospital efficiently and well. He soon became quite a legend and had a profound knowledge of every aspect of his work. Going round with him was an exciting and moving experience. He knew every one of his hundreds of patients—their histories and even their Christian names—and they in turn looked upon him not only as their doctor but as their friend. The last war brought many heavy burdens: at one time he had to run his hospital without any other medical officer. Always he was cheerful and alert, but the continued physical effort was certainly the cause of his later ill-health. He was consultant psychiatrist to the East Suffolk Hospital, and it was mainly through his efforts that a psychiatric out-patient department—one of the first in the country—was established. Banbury was a keen sportsman and a good mixer, popular with his colleagues and admired by his staff. Continued ill-health forced him to retire five years ago, but he retained his connexion with his beloved hospital as a valued member of the management committee. Percy Banbury has gone and we are the poorer for his going, but his many contributions to the treatment of mental illness will remain as his memorial. To his widow and two daughters we offer our sincere sympathy, and with them we mourn the untimely loss of a friend and a colleague.

J. J. W. EVANS, F.R.C.S.

Dr. J. J. W. Evans, a senior member of the medical profession in Jersey, died on June 20 at the age of 75.

John Jackson Whatley Evans was born in London on April 5, 1883. He studied medicine at the Westminster Hospital, qualifying in 1906. After holding the appointment of house-surgeon at his teaching hospital, he later became surgical registrar and resident medical officer there. He was admitted F.R.C.S. in 1908. From 1914 until his death he was in practice in Jersey. He leaves a widow.

A. C. H. writes: In February, 1914, Dr. J. J. W. Evans came to Jersey, and soon built up a substantial medical and surgical practice. In those days there were no nursing-homes and his operating was done in private houses and in the old Jersey Dispensary and Infirmary. In 1916 he joined up for military service in the R.A.M.C. and served on the Salonika front, but contracted dysentery and was invalided out. Between the two world wars he was medical officer to the Royal Militia of Jersey, and in 1940, when the Militia was withdrawn to England, he left Jersey with them, holding the rank of major. He served in the Military Hospital at Netley and the Battle Hospital, Reading. After the war he returned to Jersey and resumed his practice. Although the National Service Act did not apply to the island, there were many recruits for the Army, and Evans was the obvious choice of recruiting medical officer. People who did not know him often thought him unapproachable. Not so his patients, who were devoted to him, for he had a very great charm of manner and a very high standard of medical ethics. He was a general practitioner in the literal sense of the term, and he did everything, doing it well according to the standard of the time. He never really retired, and he died suddenly while visiting a patient. With his death Jersey has lost one of her most senior and respected medical practitioners.

JOHN MONTGOMERY, M.B., Ch.B.

Dr. John Montgomery, who had been in general practice at Charlton for 35 years, died at his home there on July 17. He was 62 years of age.

John Montgomery was born at Govan, near Glasgow, on September 18, 1895. From Govan High School he entered Glasgow University as a theological student, but the outbreak of the first world war in 1914 interrupted his studies and he joined the Argyll and Sutherland Highlanders, attaining the rank of sergeant. Later he was commissioned in the Machine Gun Corps, in which he served with distinction. After the war he took up medicine at his old university, graduating M.B., Ch.B. in 1924, and gaining the Burns prize for clinical medicine. Later in the same year he moved to Charlton and joined Dr. J. J. Finlay first as an assistant and then as a partner.

L. I. N. writes: Dr. Montgomery devoted the whole of his professional life to his practice in Charlton, where he was also medical officer to Siemens Brothers. For over 35 years he was medical officer to Charlton Athletic Football Club, travelling to many parts of the world with the team. A match without "the doctor" was unthinkable, and he never missed a match if he could help it. He wrote the opening letter in the controversy over the relative safety of soccer compared with rugger in the correspondence columns of the *British Medical Journal* in 1955. During the second world war he was prominent in civil defence in one of the worst-bombed dock areas, where he was in charge of a first-aid post. He was also medical officer to the local battalion of the Home Guard. Dr. Montgomery had great charm and personality as a medical man, and these gifts were much sought after on public occasions; as an after-dinner speaker he had few equals. A Latin scholar, he also knew the works of Shakespeare better than most. He was a true Christian and a gentleman at all times, and his kind is not easily replaced. Though he had suffered from a long illness, he did not let that defeat him. His only son died as a result of a tragic accident in 1951. He leaves a widow and a daughter, to whom the deep sympathy of his colleagues is extended.

J. J. DENNIS, C.B., M.D., M.Ch.

Surgeon Rear-Admiral J. J. Dennis died at his home at Beaconsfield, Buckinghamshire, on August 4. He was 100 years of age.

John Jeffreys Dinnis was born on April 22, 1858, the eldest son of Paymaster-in-Chief T. R. Dinnis, R.N.—he changed his name to Dennis soon after the turn of the century. Educated at Mannamead School, Plymouth, he studied medicine at the former Queen's College, Cork, and at Edinburgh, and graduated M.D., M.Ch. in 1880 from the old Queen's University of Ireland, which in that year became the Royal University of Ireland, and in 1908 the National University of Ireland, its present title. He entered the Royal Navy as a surgeon immediately after graduation.

rising successively through the now obsolete ranks of staff surgeon, fleet surgeon, and deputy inspector-general to the position of surgeon general in 1913. When he retired in 1918 he was granted the rank of surgeon rear-admiral. During his thirty-eight years in the Royal Navy Dennis saw active service in many parts of the world. He took part in the operations in Egypt in 1882, in the Eastern Sudan in 1884–5, in the Burmese war from 1885 to 1887, and in Eastern Somaliland in 1902–3. For his services during the first world war he was appointed C.B. in 1916, and three years later Commander of the Order of the Crown of Belgium. He was unmarried.

H. H. BAYLEY, M.D.

Dr. K. VIGORS EARLE writes: Your obituary of Dr. Harold Haynes Bayley (*Journal*, July 19, p. 169) prompts me to add some facts that I recall from the time I knew him in his early pioneer days. Harry Bayley returned to his native Barbados and put up his plate in Bridgetown. From the first he was convinced that in the West Indies medicine could only be adequately practised in conjunction with extensive laboratory and diagnostic facilities, such as would be contained in a clinic and hospital. Ploughing back his earnings from general practice, Bayley first equipped a small laboratory, in which he performed his own Wassermann reactions, blood examinations, and biochemistry. Going further, and with the help of his wife and enthusiastic colleagues, he proceeded to equip a 23-bed clinic and hospital which over the years has proved to be a truly remarkable landmark in West Indian medicine.

Bayley was a skilled and ingenious mechanic, handyman, and improviser. His workshop was a treasure house of immaculately kept precision instruments. His flair for invention stood him in good stead during the war and post-war years, when medical equipment and drugs were difficult or impossible to obtain and servicing of radiological installations came to a standstill. Under his hands a non-functioning *x*-ray unit could be taken to pieces, repaired, and restored to perfect working order. He built a serviceable B.M.R. machine, using "meccano" parts and a tennis-ball tin: it worked! When penicillin was still a research project and unobtainable in the West Indies, Harry Bayley produced it in a "distillery" which he constructed from sewer pipe and old glass lamp-chimneys. Apparatus designed and installed by him was used in the teaching of science in some of the island's principal schools, and many a young West Indian doctor had his enthusiasm first fired by being allowed to potter around in the clinic laboratory.

But above all Harry Bayley was an outstanding diagnostician and healer. His enormously successful practice included patients from as far afield as Canada, U.S.A., and Venezuela. A storehouse of Barbadian folklore and history, he and his wife were delightful hosts at their beautiful home in Bathsheba, the large garden of which had been created from a wilderness. Of great physical strength, he played football in his schooldays in Barbados, and pole-vaulted for Cambridge against Oxford in 1930 and 1931. In later years he became an enthusiastic skin-diver and underwater explorer. A generous colleague and faithful friend, he leaves a gap in our lives which will for ever remain unfilled.

H. C. BELL, M.M., L.R.C.P.&S.I.

The obituary of Dr. H. C. Bell was printed in the *Journal* of July 19 (p. 170).

J. P. C. writes: The passing of Dr. Harry Bell, of Weston-on-Trent, after three years' semi-retirement, came as a sharp blow to his many friends. He was much loved by everyone, for he had in his character and way of living everything that one could admire. As a country doctor, his skill, energy, and courage were unfailing, and he was alway happy in his activities. He could adapt himself to any circumstance or company, and he had a natural dignity and humility which were becoming. In manner he was gentle, smiling, and confident, and his ready wit, kindly humour, and optimism warmed and reassured all who met him. In his off-duty hours he was a skilled gardener, a successful painter, and a keen angler, and was much engrossed in good reading. It is good to have known him well and to know that this country still possesses men of his calibre in the old family-doctor tradition.

F. C. HOYTE, M.B., B.S., F.R.C.S.

The obituary of Mr. F. C. Hoyte was printed in the *Journal* of August 2 (p. 332).

B. J. B. writes: The news that Christopher Hoyte had been killed in a climbing accident recently in the Karakoram mountains came as a shock to his colleagues at the Liverpool thoracic surgical centre, where he had worked as surgical registrar for more than a year. He had been on special leave in order to join the expedition in which he and the leader, Mr. Edward Ward, lost their lives within a short distance of reaching the summit of Mount Minapin. We knew of his keenness and competence at mountaineering, and had not thought very seriously of the possibility that he might not return. Mountaineering and thoracic surgery have this in common, that they tax the courage, skill, and resourcefulness of the practitioner of the art. Hoyte had shown his colleagues that he had in him the makings of an excellent surgeon. Climbing in the high mountains makes exceptional demands on the performer, and we may assume that Hoyte's qualities in this respect were analogous to those that shone in his surgical work. That his death came in such a manner as to rob him both of a great achievement in climbing and of a most promising career in surgery makes it a double loss. The world of surgery is the poorer by his untimely death, but the larger world of humanity is the richer in that his spirit sought out difficult things to do, and found happiness in attempting them.

A memorial service for Sir Arnold Stott will be held in the chapel of Westminster Hospital at 12 noon on Thursday, September 25.

Medico-Legal

ANTIBIOTIC DISASTERS

[FROM OUR LEGAL CORRESPONDENT]

Four recent disasters with antibiotics are reminders that potent remedies often carry added hazards, especially if misapplied. Three of these cases were fatal and in two damages for negligence were awarded. Two concerned penicillin and two streptomycin.

Deaths from Penicillin

On May 7 last agreed damages of £12,500 were awarded by Mr. Justice Stable at Oxford Assizes to the widow of Ernest Knapton against the United Oxford Hospitals (*The Times*, May 8). Mr. Knapton, a farmer, died in the Radcliffe Infirmary after an injection of penicillin, to which he was known to be sensitive. It had been said at the inquest which followed his death in March, 1956, that at that time there had been only 20 other deaths in the country due to sensitivity to penicillin.

On June 20 a verdict of death by misadventure was recorded at the inquest on Robert Raymond Robson, aged 24, of Seaton Delaval, who died in the Royal Victoria Infirmary, Newcastle, on May 31 (*The Times*, June 21). Robson had been admitted on the previous day suffering from meningitis. He was given penicillin by lumbar puncture after an emergency operation. Before using the syringe the doctor checked its contents by three separate inquiries about its contents, amount, and strength from the student nurse in the theatre. The student nurse asked the staff nurse who

had supplied the syringe containing penicillin in a concentrated form, being under the impression that any dilution would be done in the theatre, whether it contained the ordered concentration of 10,000 units in 5 ml. The staff nurse replied that it contained 10 mega units. When the student nurse told the doctor this he asked whether that meant 10,000 units, and she said yes, since she had understood from the staff nurse that 10 "megas" meant 10,000 units. An hour after the injection, which was 500 times too strong, Robson started to have fits, and, although measures were taken to dilute the C.S.F. concentration, he died. The coroner found that death was due to acute meningitis aggravated by the penicillin injection.

Streptomycin

From January, 1958, Mrs. Josephine Cleary, aged 39, spent a little over two months in Harefield Hospital, Middlesex, with pulmonary tuberculosis, for which she was treated with streptomycin, P.A.S., and isoniazid. She then discharged herself. On April 9 she was admitted to the Central Middlesex Hospital. Treatment with streptomycin and isoniazid was continued and her tuberculosis was healing well, but on May 4 symptoms of anaemia appeared, and on May 14 she died. At the inquest on May 20 she was found to have died from pulmonary tuberculosis and aplastic anaemia caused by the streptomycin. That aplastic anaemia may be caused by streptomycin is a known risk, but it is extremely rare.

On May 1 Mr. Justice Streatfield awarded £3,000 damages against the Brighton and Lewes Hospital Management Committee for injury to Mrs. Florence Smith, of Withdean, Brighton (*The Times*, May 2), arising out of another streptomycin mishap four years ago. In May, 1954, Mrs. Smith was admitted to hospital with a severe and painful attack of boils. On May 13 a course of 30 streptomycin injections was ordered to be given at intervals of eight hours. She should therefore have received her last injection at 10 p.m. on May 23, but by reason, as the judge held, of negligence on the part of the ward sister she received four more injections than had been ordered. On May 26 she experienced a sense of giddiness, and it seemed probable that the last injection had caused the damage. Within 24 hours of it there had been a sudden and dramatic onset of symptoms. As a result she had now lost her sense of balance, which was not only a severe inconvenience, but was a source of acute embarrassment, because to those who did not know her disability she might appear to be drunk. If the doctor had prescribed the additional injections there might well have been no negligence established in the light of the knowledge of streptomycin obtaining in 1954. To allow four injections which had not been prescribed to be given was, however, negligence on the ward sister's part, and for her negligence the management committee was vicariously responsible.

Universities and Colleges

UNIVERSITY OF OXFORD

In Congregation on June 26 the following degrees were conferred:

D.M.—S. J. G. Spencer.

B.M.—*In absence*: C. Bell.

In Congregation on July 8 the appointment of Dr. R. W. Torrance as a University Demonstrator in Physiology was approved.

On July 8 the degree of M.A. was conferred on Dr. H. R. Vickers, University Lecturer in Diseases of the Skin.

The Theodore Williams Scholarship in Anatomy for 1958 has been awarded to William Francis Michael (New College), and the Radcliffe Scholarship in Pharmacology to Roger Adrian Livingston Sutton (Magdalen College).

In Congregation on July 12 the following degrees were conferred:

B.M.—N. Rosen, M. W. Price, E. H. Stibbe, J. R. Harper, W. P. Metcalfe, D. Negus, A. Percival, J. G. Wood, D. W. C. Dove, J. C. Anderson, J. Freeman, P. D. Oldreive, R. P. Golding, W. G. Everett, J. C. Probert, M. J. Brown, Janet A. Bone, Mrs. Julia D. Dawkins, Isabel C. A. Greig, *M. W. Moncrieff, *J. Dupré, *N. H. M. McKinney, *M. E. Woolrych, *S. D. Weisbaum, *Mrs. Mignon S. Marston.

**In absentia.*

UNIVERSITY OF CAMBRIDGE

Dr. C. W. McE. Pratt has been appointed a University Lecturer in the Department of Anatomy.

Dr. P. J. Randle has been reappointed a University Lecturer in the Department of Biochemistry with tenure from October 1, 1958, to the retiring age.

Dr. R. W. Ainsworth and Dr. T. D. Kellaway have been appointed University Demonstrators in the Department of Pathology with tenure from October 1, 1958, for three years.

Dr. E. H. R. Ford has been reappointed a University Demonstrator in the Department of Anatomy, with tenure from October 1, 1958, for two years, and the Hon. R. H. Adrian, M.B., B.Chir., a University Demonstrator in the Department of Physiology, with tenure from January 1, 1959, for two years.

On July 28 Vishnu Sarma was approved, in absence, for the degree of M.D.

UNIVERSITY OF GLASGOW

On June 18 the Diploma in Public Health of the University was awarded to the following successful candidates:

R. E. Atkinson, D. B. Campbell, W. MacD. Campbell, A. J. Childs, Margaret J. Devine, D. E. Donald, Margaret E. Forbes (formerly Finlayson), G. S. Henderson, A. S. L. Kennedy, J. E. Lunn, Marion T. Lunn, A. McCatch'on, Sheila Macintyre, J. B. Morris, W. M. Prentice, F. Slane, A. McI. Tait.

UNIVERSITY OF EDINBURGH

At a Graduation Ceremonial held on July 16 the following degrees and diplomas were conferred:

M.D.—[1]Lieutenant-Colonel J. P. Baird, R.A.M.C., [2]D. L. Gardner, D. S. Harling, [2]E. V. B. Morton, [2]J. G. Somerville, R. D. Young.

CH.M.—[2]J. A. L. Clark, [4]H. A. F. Dudley.

PH.D.—*In the Faculty of Medicine*: A. R. Emerson, E. O. Eranko.

M.B., CH.B.—Margaret E. Abel, [4]Liselotte Adler, E. G. Anderson, T. Y. Anderson, M. Andrews, A. D. E. A. Atukorale, K. Ballentyne, Jean E. Banyard, J. D. Bell, D. G. Binns, R. Boersma, L. R. Carney, J. M. Cochrane, W. J. C. Conn, Alison R. Coutts, Joyce Cragg, H. A. Cumming, W. A. M. Cutting, I. A. Davidson, Elizabeth N. Dawson, J. D. Donnelly, Tessa N. Dyke, P. Edmond, Jenny R. Elder, J. G. Fegler, R. A. Findlay, M. H. Finlayson, E. P. Friday, Heather S. Fulton, J. M. Gale, J. B. Gallacher, R. K. Galloway, P. J. Garwood, Willa M. Glover, A. S. Goldstein, J. Gollan, E. B. Gordon, N. Gordon, C. Gracie, P. J. S. Hamilton, Marian Handman, W. Hately, P. M. Henderson, Elise M. Hendry, D. J. Henry, J. A. Hood, G. R. Hopkinson, J. E. Hugh, [2]F. S.-L. Ip, [3]W. J. Irvine, Nesta B. James, P. D. F. James, J. C. Jenkins, R. Kilgour, Dorothy A. Lai-Fook, Christine G. Lainz, C. A. R. Lamont, W. Leadbitter, D. J. Levy, R. B. Levy, K. T. Lim, J. M. McArdle, T. R. McCall, Florence M. McCallum, H. McDonnell, G. A. McEwan, Katherine H. McEwen, R. S. McGregor, C. L. K. McIlwaine, G. Mackay, Janette Millar, J. M. Miller, A. R. Milne, A. R. K. Mitchell, Kathleen M. Moore, N. H. Munro, H. M. Murray, J. A. Ojunro, Lilian L. Orba, G. Orr, W. M. Patterson, Hilda Pedersen, Christine A. Poole, [3]B. B. Porter, R. W. Porter, I. C. F. Riach, J. Roberts, Denise E. Robertshaw, D. A. R. Robertson, K. D. Robinson, I. S. Ross, Mary C. D. Ross, W. Ryder, W. Simpson, K. B. Slawson, A. Slora, A. G. L. Smith, M. B. Smith, P. L. Smurthwaite, G. J. A. I. Snodgrass, R. H. Steele, P. M. Stell, J. Stevenson, V. B. Stimpson, E. I. R. Taylor, J. M. Thomas, E. G. Thomson, Hilary Titterington, D. M. Tod, W. C. Uduku, T. J. Wallace, Sadie D. Walsh, A. G. Watson, J. A. G. Watt, R. G. Weeder, J. P. Welch, D. W. Welsh, A. E. Wightman, Christine Wileman, B. J. Wilken, Joyce M. Williamson, R. S. Wilson, Evelyn Wray, D. Wynberg.

DIPLOMA IN PUBLIC HEALTH.—Jean M. W. Bolt, Isabel J. Buchanan, B. Chaudhuri, M. P. Hutchinson, Edith M. McLean, D. Penman, J. N. Robertson, A. D. Ross, J. J. Saave, Edith Scott, J. C. M. Sharp, G. W. Simpson, J. A. K. Wallace.

DIPLOMA IN TROPICAL MEDICINE AND HYGIENE.—K. R. Balasubramanian, N. K. Ginwala, V. Jayakumaran, S. Mukherjee, T. D. G. Pillai, B. Prasad, B. R. Dodda, K. P. George, K. R. Nambudiripad, N. K. Sinha.

DIPLOMA IN MEDICAL RADIODIAGNOSIS.—S. McC. Smith.

[1]*In absentia.* [2]Highly commended for thesis. [3]Commended for thesis. [4]Awarded gold medal for thesis. [5]Passed with honours.

The following scholarships, etc., were awarded in the Faculty of Medicine: *Ettles Scholarship and Leslie Gold Medal in Medicine, Mouat Scholarship in the Practice of Physic, Richard Brown Scholarship*, and *Pattison Prize in Clinical Surgery*, W. J. Irvine. *Scottish Association for Medical Education of Women Prize* and *Dorothy Gilfillan Memorial Prize*, Liselotte Adler. *Chiene Medal in Surgery*, H. A. F. Dudley. *Buchanan Scholarship in Obstetrics and Gynaecology*, Janette Millar. *James Scott Scholarship in Obstetrics and Gynaecology*, B. B. Porter. *Beaney Prize in Anatomy and Surgery*, W. J. Irvine and B. J. Wilken (equal). *Keith Memorial Prize in Systematic Surgery* and *Annandale Gold Medical in Clinical Surgery*, Evelyn Wray. *Lawson Gifford Prize in Obstetrics and Gynaecology*, Mary C. D. Ross. *Murdoch*

Brown Medal in Clinical Medicine, B. J. Wilken. *Royal Victoria Hospital Tuberculosis Trust Gold Medal*, W. Hately. *Graduate Research Fellowships*, Margaret M. Beath, S. H. Davies, G. D. Forwell, R. A. Harkness, Sybil M. Lloyd. *Graduate Research Scholarships*, J. McE. McI. Neilson, A. G. C. Renwick, I. W. Sutherland, B. I. Tyson, Joan Warriner. *Graduate Travelling Scholarships*, R. R. Gillies, A. Logan, C. Rayski. *Ellis Prize in Physiology*, Sybil M. Lloyd. *Gunning Victoria Jubilee Prize in Zoology*, D. C. Barker. *Lauder Brunton Medal and Prize in Pharmacology and Therapeutics*, G. E. Mawer. *Lawrence Poole Prize in Rehabilitation after Poliomyelitis*, W. L. Cresswell. *Singapore Gold Medal*, G. W. A. Dick. *Undergraduate Scholarships*, I. M. L. Donaldson, M. George, P. Graham, R. N. Hedley, R. B. Jones, A. H. McDonald, A. T. Proudfoot, D. J. C. Shearman. *Senior John Aitken Carlyle Bursary in Anatomy and Physiology*, D. J. C. Shearman. *Gunning Medical Bursary*, G. W. K. Donaldson. *Mackenzie Bursaries in Anatomy*, J. A. Phillips, Sonja F. Parboosingh, C. J. Cutting, Rosalie M. Turner. *George William Falconer Macnaughton Bursary in Physiology*, A. H. McDonald. *Stirton Bursary*, W. L. Ford. *Whiteside Bruce Bursary*, A. V. P. P. Kurien. *Colonel Thomas Biggam Memorial Medal and Prize in Pathology*, G. D. Stark. *Lewis Cameron Undergraduate Prize in Bacteriology*, T. McN. Kennedy and W. I. H. Shedden (equal); *proxime accessit*, J. J. B. Petrie. *Cunningham Memorial Medal and Prize in Anatomy*, Valerie A. Brooks. *Boots Drummond Memorial Prize in Biochemistry*, Brighid E. Harris. *MacGillivray Prize in Biology* and *Vans Dunlop Prize in Biology*, D. C. Cameron. *Maclagan Prize in Forensic Medicine*, W. I. H. Shedden. *Ian Oswald Prizes in Anatomy*, D. J. C. Shearman and H. C. Drysdale. *Ross-Inkster Medal in Public Health and Social Medicine*, J. H. Turner. *Vans Dunlop Prize in Chemistry and Physics*, B. Hawley and A. V. P. P. Kurien (equal). *Wightman Prize in Clinical Medicine*, J. P. Welch. *Robert Wilson Memorial Medal and Prize in Chemistry*, B. Hawley.

UNIVERSITY OF LONDON

Professor G. Macdonald has been appointed representative of the University at the sixth International Congresses on Tropical Medicine and Malaria, to be held at Lisbon from September 5 to 13, 1958.

The following have been recognized as teachers of the University in the subjects indicated in parentheses: *Royal Dental Hospital of London School of Dental Surgery*, Dr. H. J. J. Blackwood (Dentistry); *Institute of Urology*, Mr. J. G. Sandrey (Surgery (Urology)); *Middlesex Hospital Medical School*, Dr. F. H. Scadding (Medicine); *Guy's Hospital Medical School*, Dr. J. R. Trounce (Therapeutics); *Institute of Child Health*, Mr. D. J. Waterston (Surgery) and Mr. D. I. Williams (Surgery (Urology)); *Postgraduate Medical School of London*, Dr. G. J. Popjak (Biochemistry).

The John Marshall Fellowship in Surgical Pathology has been awarded, from April 1, 1958, to Dr. J. L. Proven, who will also hold the Whait Fellowship awarded by University College Hospital Medical School.

Dr. Katharine G. Lloyd-Williams has been re-elected Dean of the Faculty of Medicine.

The following have been appointed or nominated for appointment or reappointment on the governing bodies of the institutions indicated in parentheses: Dr. T. C. Hunt (Inter-University Council for Higher Education Overseas); Mr. J. B. Hume (Royal Masonic Institution for Boys, Bushey); Dr. W. K. Taylor (Pewley County Secondary School, Guildford); Dr. G. W. Heckels (Rosebery County School for Girls and Glyn County School for Boys, Epsom).

The William Julius Mickle Fellowship for 1957-8 has been awarded to Professor J. B. Kinmonth, and the Mary Scharlieb Research Studentship for 1958-9 to Dr. Julia M. Fourman.

The following candidates at the London School of Hygiene and Tropical Medicine have been approved at the examinations indicated:

ACADEMIC POSTGRADUATE DIPLOMA IN PUBLIC HEALTH.—J. A. R. Anson, A. J. Barwood, A. Bhoomkar, G. Castle, Elizabeth P. Cloake, W. G. Cooke, *Elizabeth J. Coulter, W. E. Crocker, Evelyn C. Cummines, L. A. C-R. C. da Motta, W. R. Davies, Margaret Duncan, B. Gampel, A. K. Gupta, D. F. Hadman, T. Hall, D. R. Haupt, A. J. Hibell, E. G. Larson, H-Y. Li, P. G. W. A. Lommerse, C. Lydon, *R. W. McCollum, W. H. McDonald, H. F. McElligott, W. R. McKibben, J. A. McKinnon, C. J. H. Mann, Ann B. Marples, M. Mphahlele, R. Neumann, S. R. Ray, T. H. Redfern, J. H. Sewart, H. Shore, E. R. Simpson, J. J. Slome, L. S. Sodhy, R. H. Strudwick, D. Sturman, S. V. Tamhane, *G. S. Udall, J. de M. Vink, M. W. L. White, R. E. Woolley, J. R. R. Wray.

ACADEMIC POSTGRADUATE DIPLOMA IN TROPICAL MEDICINE AND HYGIENE.—A. H. Nasr.

ACADEMIC POSTGRADUATE DIPLOMA IN APPLIED PARASITOLOGY AND ENTOMOLOGY.—C. Achuthan, R. W. Butler, D. Khan, P. D. Marsden, V. D. Nguy, H. Prasad, D. K. Ray Chaudhuri, P. Sirivorasarn.

*Awarded a mark of distinction.

UNIVERSITY OF WALES

At a Congregation on July 28 the following degrees were conferred:

M.B., B.CH.—T. J. Bayley, D. Bevan, Berian Davies, R. J. Davies, J. G. Edwards, D. R. Evans, J. D. Evans, R. R. Evans, D. R. Freebury, J. B. T. Griffiths, Madeline F. M. Gunn, Jean Hellings, R. L. H. Hughes, J. E. A. Kenrick, W. C. Lane, Reza Larizadeh, D. W. Lewis, Rena Lewis, A. R. Lloyd, M. P. Mahoney, P. J. McCarthy, Mary H. Morgan, R. B. Morgan, C. H. Naylor, T. Powell, D. J. Sadler, C. S. Selby, J. A. Wyatt, Tada Yipintsoi.

ROYAL COLLEGE OF SURGEONS OF ENGLAND

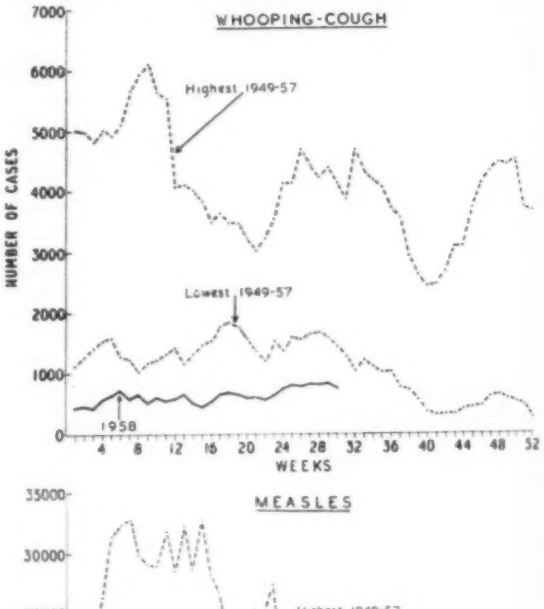
At a meeting of the Council of the College held on July 10 the Hallett Prize was presented to Miss Mohini V. Ramchandani, of the University of Bombay.

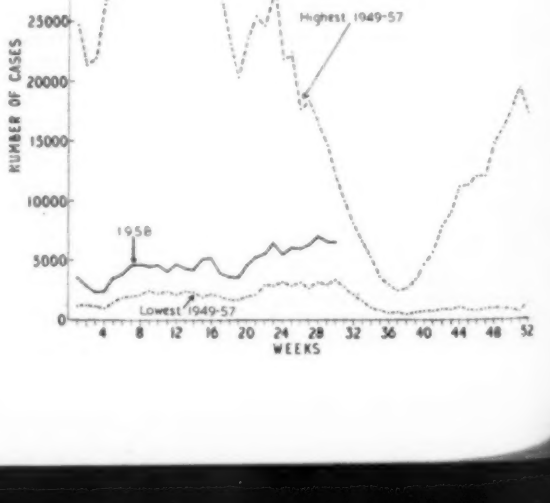
A diploma of Fellowship was granted to R. M. Wagh.

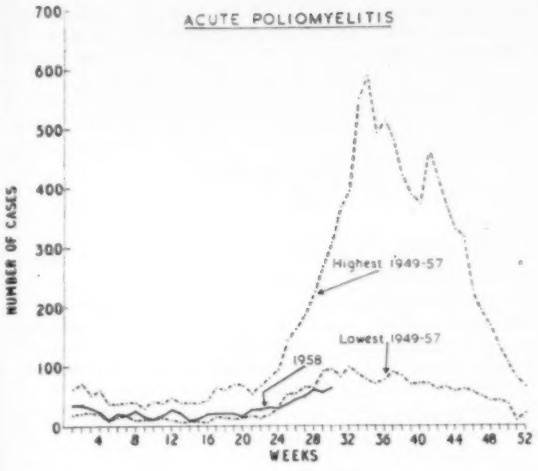
Vital Statistics

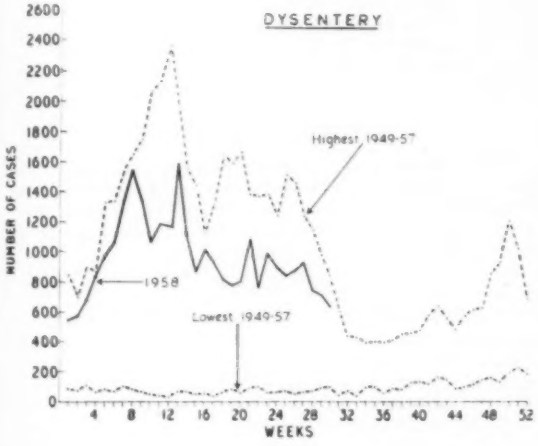
Graphs of Infectious Diseases

The graphs below show the uncorrected numbers of cases of certain diseases notified weekly in England and Wales. Highest and lowest figures reported in each week during the years 1949–57 are shown thus ------, the figures for 1958 thus ———. Except for the curves showing notifications in 1958, the graphs were prepared at the Department of Medical Statistics and Epidemiology, London School of Hygiene and Tropical Medicine.









Week Ending August 2

Infectious diseases were less prevalent in England and Wales during the week ending August 2; the falls in the number of notifications included 295 for measles, from 6,594 to 6,299, 225 for food-poisoning, from 486 to 261, 120 for scarlet fever, from 672 to 552, 101 for dysentery, from 637 to 536, and 40 for whooping-cough, from 749 to 709.

The largest decreases in the returns of measles were 122 in Kent, from 403 to 281, 74 in Middlesex, from 507 to 433, 71 in Staffordshire, from 255 to 184; and the largest increases were 79 in Sussex, from 129 to 208, and 61 in Cornwall, from 100 to 161. A small fall in the notifications of scarlet fever was recorded in most areas of the country. The largest fluctuations in the return of whooping-cough were a rise of 31 in Hampshire, from 22 to 53, and a fall of 32 in Lincolnshire, from 43 to 11. 4 cases of diphtheria were notified; 2 were from Birmingham C.B.

The notifications of acute poliomyelitis numbered 65, and these cases were 1 less for paralytic and 3 more for non-paralytic cases than in the preceding week. The largest returns were Yorkshire West Riding 18 (Leeds C.B. 7, Halifax C.B. 2, Wakefield C.B. 2, Normanton U.D. 2), Essex 9 (Southend-on-Sea C.B. 3), Lancashire 6, and London 5 (Islington 2). The chief centres of dysentery were Yorkshire West Riding 148 (Barnsley C.B. 48, Harrogate M.B. 20, Thorne R.D. 16, Huddersfield C.B. 13, Leeds C.B. 12, Wakefield C.B. 10), Lancashire 84 (Liverpool C.B. 31, Manchester C.B. 10), London 71 (Wandsworth 11), Gloucestershire 33 (Bristol C.B. 33), Warwickshire 31 (Coventry C.B. 13, Birmingham C.B. 11), and Nottinghamshire 20 (Nottingham C.B. 11).

INFECTIOUS DISEASES AND VITAL STATISTICS

Summary for British Isles for week ending **July 26** (No. 30) and corresponding week 1957.

Figures of *cases* are for the countries shown and London administrative county. Figures of *deaths* and *births* are for the whole of England and Wales (London included), London administrative county, the 17 principal towns in Scotland, the 10 principal towns in Northern Ireland, and the 14 principal towns in Eire.

A blank space denotes disease not notifiable or no return available.

The table is based on information supplied by the Registrars-General of England and Wales, Scotland, N. Ireland, and Eire, the Ministry of Health and Local Government of N. Ireland, and the Department of Health of Eire.

CASES	1958					1957				
	Eng. & Wales	Lond.	Scot.	N. Ire.	Eire	Eng. & Wales	Lond.	Scot.	N. Ire.	Eire
Diphtheria ..	0	0	2	0		3	0	0	0	9
Dysentery ..	637	118	163	10	1	353	25	120	4	
Encephalitis, acute	5	1		0		1	0		0	
Enteric fever:										
Typhoid ..	0	0	0	0		1	0	0	0	
Paratyphoid ..	11	0	4(B)	0	1(B)	4	1	0	0	
Food-poisoning ..	486	38	23	8		501	36	13	0	
Infective enteritis or diarrhoea under 2 years				14	18				14	32
Measles*	6,594	508	39	32	22	11,623	219	73	112	95
Meningococcal infection	16	0	16	1		18	1	10	3	
Ophthalmia neonatorum	15	1	5	0		27	0	3	0	
Pneumonia† ..	182	15	107	1		172	11	93	1	2
Poliomyelitis, acute:										
Paralytic ..	38	2	26	3	10	137	8	13	26	2
Non-paralytic ..	25	2				123	13			
Puerperal fever§ ..	188	25	4	0		202	30	5	0	
Scarlet fever ..	672	48	28	14	21	564	44	58	4	16
Tuberculosis:										
Respiratory ..	521	59	101	15		661	79	97	16	
Non-respiratory	73	7	19	7		86	5	16	3	
Whooping-cough..	749	37	71	39	58	1,445	68	72	6	32

DEATHS	1958					1957				
	Eng. & Wales	Lond.	Scot.	N. Ire.	Eire	Eng. & Wales	Lond.	Scot.	N. Ire.	Eire
Diphtheria ..	0	0	0	0	0	*No comparable figures available.*	0	0	0	0
Dysentery ..	0	0		1			0		0	
Encephalitis, acute		0			0		0			0
Enteric fever ..	0	0	0	0			0	0	0	
Infective enteritis or diarrhoea under 2 years	3	0	0	1	1		0	1	0	0
Influenza	7	1	0	0	0		0	0	0	1
Measles		0	0	0			0	0	0	1
Meningococcal infection		0	0				0	0		
Pneumonia ..	263	24	9	9	1		23	13	.	4
Poliomyelitis, acute	3	0		0	0		0		0	0
Scarlet fever ..		0		0	0		0	0	0	0
Tuberculosis:										
Respiratory ..	59	4	8	0	2		4	5	2	7
Non-respiratory		3	1	0	0		2	1	0	0
Whooping-cough..	0	0	0	0	0		0	0	0	0
Deaths 0–1 year ..	263	25	31	4	3		25	34	6	11
Deaths (excluding stillbirths) ..	7,996	597	510	106	137		658	471	94	155
LIVE BIRTHS ..	13,102	1157	926	197	348		1111	959	227	381
STILLBIRTHS..	279	20	19				34	24	\	

* Measles not notifiable in Scotland, whence returns are approximate.
† Includes primary and influenzal pneumonia.
§ Includes puerperal pyrexia.

Medical News

Medical War Crimes.—It is reported that the Minister of the Interior of Schleswig-Holstein has withdrawn Herta Oberheuser's licence to practise medicine, his decision being based on a Reich Statute of 1935 (*Daily Telegraph*, August 12). The circumstances of Herta Oberheuser's reinstatement as a medical practitioner after her release from prison, where she had served only part of a 20-years sentence for war crimes and crimes against humanity, were described by Dr. E. Townsend at the Annual Representative Meeting last month (see *Supplement*, July 19, p. 56). The A.R.M., besides expressing its deep distress at the reinstatement of a practitioner guilty of medical war crimes, instructed Council to bring the views of the British Medical Association to the notice of those responsible "for this cynical affront to the honour, morals, and high ideals of the true practice of medicine throughout the world."

Poliomyelitis Vaccine.—About 15 million doses of vaccine have been administered so far in Britain. Six million children have received two injections and about one million children one injection. A spokesman at the Ministry of Health said last week that since the start of the vaccination campaign early in 1956 there had been, up till July 31, 1958, 35 cases (33 of them being children) in which poliomyelitis developed within thirty days of inoculation. There was no evidence of lack of safety in use of any batch of vaccine issued in Britain.

Isaac Wolfson Foundation.—The present policy of this Foundation, created by Mr. WOLFSON in 1955, is primarily to advance education and health in the United Kingdom and the Commonwealth. The board of trustees, under the chairmanship of LORD NATHAN, has recently been enlarged. There are two medical members, Sir STANFORD-CADE and Lord EVANS. The Foundation has undertaken grants totalling more than £1m., and has a capital fund of over £6m. The grants made between 1955 and 1958 include the following: £250,000 for the Westminster Hospital School of Nursing; £250,000 for a new hall of residence for Commonwealth students at London University, £150,000 for the British Empire Cancer Campaign (for fundamental research in the field of biology); £125,000 for the postgraduate medical school at Hammersmith; £50,000 for the Royal National Institute for the Blind; and £25,000 for the British Council for the Welfare of Spastics.

Travelling Awards.—The following travelling awards for the forthcoming academic year have been announced by the Medical Research Council. Rockefeller Travelling Fellowships in Medicine: Dr. G. BURNSTOCK, research assistant, department of pharmacology, University of Oxford; Mr. P. J. HOLLOWAY, external scientific staff member, Medical Research Council Laboratories, Hampstead; Mr. W. B. JENNETT, lecturer in neurosurgery, University of Manchester; Dr. A. P. MATHIAS, lecturer in biochemistry, University College, London; Dr. R. P. MICHAEL, clinical research fellow, department of experimental neuroendocrinology, Institute of Psychiatry, Maudsley Hospital; Dr. P. H. A. SNEATH, scientific staff member, National Institute for Medical Research, Mill Hill. Lederle Travelling Fellowship in Medicine: Dr. R. J. LINDEN, lecturer in physiology, University of Leeds. Alexander Pigott Wernher Memorial Travelling Fellowship in Ophthalmology and Otology: Dr. G. B. ARDEN, research assistant, Institute of Ophthalmology, London. French Exchange Scholarships in Medical Science: Miss J. E. CREMER, scientific staff member, Medical Research Council Toxicology Research Unit, Carshalton; Miss S. REIMAN, assistant lecturer in psychology, Institute of Psychiatry, Maudsley Hospital. Travelling fellowships in medicine have been awarded by the Eli Lilly Company of Indianapolis, U.S.A., after nomination by the Medical Research Council, to the following candidates: Mr. J. D. GRIFFITHS, senior registrar in surgery, St. Bartholomew's Hospital; Dr. C. W. M. WILSON, lecturer in pharmacology and therapeutics, University of Liverpool. Travelling fellowships in medical science have also been awarded by the United States Public Health Services, National Institutes of Health, Bethesda, Maryland, after nomination by the Medical Research Council, to the following candidates: Dr. B. S. HARTLEY, research fellow, department of biochemistry, University of Cambridge; Dr. K. W. CROSS, reader in physiology, St. Mary's Hospital Medical School; Dr. A. DOIG, medical registrar, Royal Infirmary, Edinburgh.

Sir Eric Ashby has been appointed Master of Clare College, Cambridge, as from October 1.

Dr. M. B. McIlroy, first assistant at the Institute of Cardiology, London, has been appointed an associate professor of medicine in the University of California in San Francisco to work in a new cardiovascular research institute directed by Dr. JULIUS H. COMROE.

B.M.J. Index.—The half-yearly indexes to Volume I of the *Journal* and the *Supplement* for 1958 are now being sent to members who receive them regularly and to subscribers. Members who have not previously asked for the indexes to be sent regularly to them can obtain copies, post free, on application to the Publishing Manager, B.M.A. House, Tavistock Square, London, W.C.1; those wishing to receive the indexes regularly should mention this.

COMING EVENTS

Medical History.—The 16th International Congress of the History of Medicine will be held at the Faculty of Medicine, Montpellier University, on September 22–28. Travel concessions are available for the journeys in France. Full details from the Faculty of Medicine.

NEW ISSUES

SPECIALIST JOURNALS AND ABSTRACTS

The journals listed below are obtainable from the Publishing Manager, B.M.A. House, Tavistock Square, London, W.C.1.

Medical and Biological Illustration.—Issued quarterly (£3 annually). The new issue, Vol. 8, No. 3, includes:

UNIVERSALISTIC CONCEPTS IN CHINESE ANATOMY AND MEDICINE. Ilza Veith.
A NEW DEVICE FOR ILLUSTRATORS, PRINTERS, AND DISPLAY ARTISTS. John C. Shepherd.
ORGANIZATION AND ADMINISTRATION OF A UNIVERSITY DEPARTMENT OF AUDIO-VISUAL AIDS. Newman Rosenthal.
PHOTOGRAPHY OF THE NEGRO SKIN. T. N. Salthouse.
A MINIATURE FLASH SPOTLIGHT WITH FOCUSING LAMP FOR THE PHOTOGRAPHY OF SMALL OBJECTS. P. J. Fiske.
REFERENCE MATERIAL FOR MEDICAL ILLUSTRATORS. Carol Dawbarn.
EQUIPMENT AND METHODS:
KELVIN HUGHES RAPID PROCESSING PHOTOGRAPHIC PROJECTOR.
ELECTRIC POINTER.
ILFORD FORMALITH FILM.
SILICONE BONDING RESIN MS 840.
HOSE-TAP UNION.
UKV UNIVERSAL COMBINATION STAND.

SOCIETIES AND LECTURES

A fee is charged or a ticket is required for attending lectures marked ●. Application should be made first to the institution concerned.

Friday, August 22

INSTITUTE OF DISEASES OF THE CHEST.—5 p.m., Dr. H. Nicholson: clinical demonstration.

BIRTHS, MARRIAGES, AND DEATHS

BIRTHS

Guthrie.—On August 6, 1958, to Olive Ada and John Guthrie, of Hazebrouck, Worting, Basingstoke, Hants, a son.
Patterson.—On August 1, 1958, to Dr. and Mrs. John A. Patterson, of Trenabie House, Westray, Orkney, a third son.

DEATHS

Berry.—On July 28, 1958, at The Green Farm, Winston Green, near Stowmarket, Suffolk, Charles Harold Berry, M.R.C.S., L.R.C.P., aged 81.
Blake.—On July 29, 1958, Eliot Watson Blake, M.R.C.S., L.R.C.P., of 468, Unthank Road, Norwich, Norfolk.
Macfarlane.—On July 27, 1958, at The Nook, Blebo Craigs, Fife, Andrew Duncan Macfarlane, M.B., Ch.B.
Neil.—On July 27, 1958, Hugh Loudon Neil, M.B., Ch.B., of Hartsop House, Holt, Norfolk, formerly of Horbury, Wakefield, Yorks., aged 70.
Robinson.—On July 25, 1958, at the Hampstead General Hospital, Margaret Helen Rattray Robinson, M.B., Ch.B., of 3, Turner Drive, London, N.W.
Power.—On August 10, 1958, John David Power, L.R.C.P.&S.Ed., L.R.F.P.S., of 3, Grove Park Road, London, S.E., aged 94.

Any Questions ?

We publish below a selection of those questions and answers which seem of general interest. It is regretted that it is not possible to supply answers to all questions submitted.

Grading of Tumours

Q.—*Is the grading of malignant tumours still regarded as of value ?*

A.—Many attempts have been made to correlate the degree of malignancy of a tumour with its histological structure, and Broders's[1 2] work on squamous-cell carcinomas and sarcomas is well known. In general the more anaplastic carcinomas are of greater malignant potential than the well-differentiated carcinomas and consequently the prognosis is worse than when much keratinization is present. The anaplastic carcinomas are more sensitive than the well-differentiated squamous carcinomas, as exemplified by the so-called lymphoepitheliomas which quickly regress with radiotherapy but metastasize and recur frequently. Kernohan and Sayre[3] have suggested that most gliomas represent varying degrees of anaplasia of adult cells, and rapidity of growth brings about the multipolar, bipolar, unipolar, and apolar types of cells in the various gliomas. Thus the astrocytoma, astroblastoma, and glioblastoma multiforme represent varying grades of malignancy of tumours arising from astrocytes. The use of the name of the generic glial cell with the addition of grades 1 to 4, designating the degree of malignancy, eliminates confusion caused by individual names. Dukes[4] graded rectal carcinomas according to differentiation (1, 2, 3, or 4) and according to the spread of the tumour on histological examination (A, B, C1, and C2); the assessment of spread has been more valuable in assessing the prognosis than the degree of differentiation, although it is agreed the degree of spread is often indicated by the degree of differentiation. The grading of breast carcinoma has also been valuable in assessing the prognosis.

An objection to the grading of tumours on the histological examination of a small piece of tissue is that this may not be representative of the whole tumour. Nevertheless, the grading of tumours is still regarded as of value.

REFERENCES
[1] Broders, A. C., *Ann. Surg.*, 1921, **73**, 141.
[2] —— Hargrave, R., and Meyerding, H. W., *Surg. Gynec. Obstet.*, 1939, **69**, 267.
[3] Kernohan, J. W., and Sayre, G. P., in *Cancer*, 1958, edited by R. W. Raven, vol. 2, p. 529. Butterworth, London.
[4] Dukes, C. E., *J. Path. Bact.*, 1940, **50**, 527.

Tracers for Secondary Ovarian Growths

Q.—*Are there any radioactive isotopes which will trace early secondary ovarian carcinomata ?*

A.—It is disappointing that at present it is not possible to detect secondary ovarian carcinomata by the use of radioactive isotopes. On the other hand, in carcinoma of the thyroid it is possible to localize secondaries by means of the radio-iodine-uptake method. In the case in question there is nothing that can be done except to wait for systemic evidence of the presence of secondaries. Certainly one would not subject the patient to a general radiological examination of the skeleton on the off-chance of finding an abnormality.

Effects of Contaminated Salk Vaccine

Q.—*How long was it after the injections in America of contaminated Salk vaccine had been given that the first signs of poliomyelitis developed in those affected ? Was there any common presenting symptom or sign in these cases ?*

A.—An analysis of the cases of paralytic poliomyelitis caused by the contaminated batches of Cutter vaccine in 1955 showed that there were 56 cases in which the paralysis was not bulbar and in which both the site of inoculation of the vaccine and the site of paralysis were known. The interval between inoculation and the development of paralysis was between 4 and 11 days in 49 of these 56 cases. In 5 cases the interval was shorter, and in 2 cases it was longer. A similar distribution of intervals is observed in monkeys inoculated experimentally with living poliomyelitis virus. So far as I know, detailed histories of these 56 cases have not been studied in this country, and no published work has drawn attention to any common presenting symptom or sign. It is, however, very significant that, of the 56 cases mentioned above, 41 exhibited paralysis in the inoculated limb (plus other sites) and only 5 showed paralysis of the uninoculated limb (plus other sites).

Selective Collapse of Lung Cavities

Q.—*How is it that artificial pneumothorax causes selective collapse of tubercular cavities in the lung, when they are not adherent, thick-walled, calcified, or in tension, when the elastic recoil is normal in the remaining lung tissue and destroyed in the cavity itself ?*

A.—It is probable that selective collapse, when it occurs, of tuberculous lung as a result of pneumothorax depends upon obstruction of bronchial pathways. In the case of non-cavitated lung it is probably small bronchi and bronchioles which are obstructed, giving rise to air absorption beyond, which gives the selectivity of lung collapse. In the case of cavities, selective collapse depends upon occlusion at some level, probably at the bronchocavitary junction, of the bronchial pathway into the cavity.

Haemophilic Gene Carriers

Q.—*Is there a test which will show whether a female is a carrier of the haemophilic gene ?*

A.—There is at present no dependable test to show whether or not a female in a haemophilic family carries the gene. Some females in some haemophilic families are found to have rather low levels of anti-haemophilic globulin in the blood. These are more likely to carry the abnormal gene than those whose blood A.H.G. level is normal. Again, some females in haemophilic families give a clinical history of menorrhagia or excessive bleeding following dental extraction. In these females a positive tourniquet test or long bleeding-time test may be found. These females are also rather more likely to be carriers than their symptomless relatives. But many known carriers have no clinical or laboratory indication of abnormality.

Tennis Elbow

Q.—*What treatments are there for "tennis elbow" ?*

A.—Though tennis elbow is a well-defined condition clinically, its pathology is at best uncertain and its cause usually unknown. Indeed, there are probably several causes. Treatment is therefore empirical, and, as always in such circumstances, many forms of therapy are advocated, often with all the force and dogmatism which tend to accompany ignorance of pathology. In most cases, if not in all, the symptoms eventually subside spontaneously. Whatever form of treatment is being given at the time of natural remission gets the credit. Short-wave diathermy, anodal galvanism, galvanic acupuncture, deep massage, faradic stimulation of the extensor muscles of the forearm, injection of a local analgesic, manipulation, fixation in plaster-of-Paris, and many other methods are all available, and all have their advocates and their score of "cures."

The only methods which appear to produce immediate relief which lasts for any length of time are the injection of hydrocortisone and the operative stripping of the common extensor origin from the lower end of the humerus. Hydrocortisone injection produces immediate and lasting relief in about half of the cases in which it is tried. The needle should be thrust into the most tender spot until it produces pain of the exact quality of which the patient complains. About half a millilitre of a standard commercial hydrocortisone solution is then injected. The injection increases the pain almost to the point of agony, but the pain ceases as soon as the injection is complete. A painless injection does no good. If the relief obtained is not permanent, a second injection may be given after an interval

of at least two weeks. The small number of patients whose symptoms persist for 18 months or more can usually be cured by operation. The operation is a minor one, but it is seldom necessary. For details of its performance the inquirer is referred to the textbooks on operative orthopaedic surgery.

NOTES AND COMMENTS

Brucella Abortus in Milk.—Dr. J. COUTTS MILNE (Farnham, Surrey) writes: In practice investigation on the farm of the problem of *Br. abortus* in milk is not always so easy as would appear from the reply in "Any Questions?" (July 26, p. 260). By the time one becomes aware that tuberculin-tested, unpasteurized milk contains *Br. abortus* the herd is probably well infected and possibly has been vaccinated with S.19, so that the "ring" test may be of only limited value. The intermittent excretion of *Br. abortus* in the milk adds to the difficulties. I understand, too, that the ring test, although valuable for group and herd-pooled samples,[1] is not now considered of much use in testing individual animals. The obligation to take action rests with the medical officer of health, usually under Section 20 of the Milk and Dairies Regulations, 1949, which empowers him to serve notice for heat treatment if he is satisfied that the milk is infected with disease communicable to man.

REFERENCE

[1] *Monthly Bull. Minist. Hlth Lab. Serv.*, 1956, **15**, 85.

Treatment for Roundworms.—Dr. L. G. GOODWIN (Wellcome Laboratories of Tropical Medicine, London, N.W.1) writes: May I respectfully disagree with parts of the answer given to the question on the treatment for roundworms ("Any Questions?" July 26, p. 260)? (1) Hexylresorcinol is not nowadays used very extensively for removing roundworms. Like tetrachlorethylene, it stimulates them before they die.[1] Unless given in cachets, the drug erodes the buccal mucosa; when given as an enema it has been known to strip large flakes from the rectal mucosa. What it does to the human gastric mucosa when administered in cachets has not been observed. (2) It is true that a dose of 1 g. of hexylresorcinol is a little less expensive than 4 g. of piperazine if the drugs are purchased as chemical substances. Nevertheless, the dispensing fee for the preparation of cachets costs the National Health Service 4s. (*Drug Tariff*, April, 1958); the total cost of a prescription for a dose of hexylresorcinol is about 4s. 4½d. A dose of elixir of piperazine citrate *B.P.C.* containing 4 g. of piperazine, together with the dispensing fee of 1s. 2d., costs about 1s. 8½d. The only proprietary preparation of hexylresorcinol listed in *The Retail Chemist* trade price list (1958) is from four to six times as expensive as proprietary elixirs and tablets of piperazine. (3) The *British Pharmaceutical Codex (Supplement, 1957)* states that 300 mg. of piperazine adipate is equivalent to 250 mg. of the hexahydrate. The doses of 25 mg. per kg. of adipate and 50–75 mg. per kg. of hexahydrate recommended in "Any Questions?" are therefore far from equivalent in piperazine content. It has been shown[2] that a suitable single dose of piperazine for the expulsion of roundworms contains 4 g. of hydrate and that the choice of salt is not important. This dose can be given to all except very small children. It is unnecessary to starve the patient before treatment or to purge him afterwards. Small children are sometimes admitted to hospitals in the tropics with toxaemia, vomiting, and convulsions caused by massive *Ascaris* infections. These patients are often severely dehydrated, and it is important that the fluid and electrolyte balance should be restored by parenteral drip therapy before anthelmintics of any kind are administered.

REFERENCES

[1] Goodwin, L. G., *Brit. J. Pharmacol.*, 1958, **13**, 197.
[2] —— and Standen, O. D., *Brit. med. J.*, 1958, **1**, 131.

Dr. MARY A. HARVIE (Hamilton, Lanarkshire) writes: I agree with your expert ("Any Questions?" July 26, p. 260) that in the treatment of roundworm infection there is little to choose between hexylresorcinol and piperazine adipate or hydrate. Your expert does not mention oil of chenopodium, which I have found to be much more effective than either of these in India. We give ol. chenopod., 2–5 min. for children, and 10–12 min. for adults, followed an hour later by a saline purgative. I have never met with any ill effects, even in pregnant patients.

OUR EXPERT replies: Dr. Goodwin's authority for stating that hexylresorcinol is not nowadays extensively used is open to question. Throughout the tropics generally it is probably the most commonly used single drug for this purpose. It is true that it irritates mucous membranes, but many cases have been encountered in which cachets have even been chewed without markedly untoward results. During the past 10–20 years the drug has been used extensively and has come to be known as one which is very reliable and singularly free from side-effects. Concerning the second point, Dr. Goodwin falls into the error of presuming that the *British Medical Journal* is read only by doctors practising in the National Health Service. The majority of those who both read the *Journal* and commonly treat roundworm infections are resident overseas, where to put the drug into a cachet is as convenient and about as cheap as it is to dispense it in a bottle. Regarding the third point, the dosage of piperazine adipate given in the answer is that recommended by the makers, and, although lower than that recommended by the makers of the citrate and hexahydrate salts, it has been found to be effective. Concerning the final point, when vomiting and convulsions occur in association with ascariasis they almost invariably result from intestinal obstruction rather than from toxaemia caused by the worms' products. The treatment of such obstruction is a subject which is quite outside the scope of the original question.

In answer to Dr. Harvie's letter, oil of chenopodium is very much more toxic than either hexylresorcinol or piperazine compounds and for this reason is not recommended.

Thermometer Hygiene.—Dr. W. M. PENNY (Beckenham, Kent) writes: A convenient disinfectant for thermometers, which does not remove the colour from the figures, is acid. carbol., 1 in 20. An ounce (28 ml.) bottle of this, carried in the ticket pocket, may be used for cleansing and the thermometer itself kept in a glass thermometer-case containing the same solution.

OUR EXPERT replies: Unquestionably 5% phenol is an adequate disinfectant, but there is a risk of caustic effect if the thermometer were inadvertently used without being first rinsed free from it, and it has a solvent action on the colouring matter in the graduations. It is mainly for the latter reason that phenolic disinfectants have been considered unsuitable for this purpose. J. B. M. Green and J. B. Penfold[1] write of 5% phenol: ". . . it tends to remove the figures from the thermometer and patients dislike its taste." One of the largest manufacturers of clinical thermometers in this country tells me that recent improvements in the material used for filling the graduations have rendered it more resistant to solvent action, and this no doubt accounts for Dr. Penny's more fortunate experience, but they still do not recommend that thermometers be actually stored in a solution of phenol: they should preferably be immersed for a long enough period for disinfection (10 minutes should suffice) and then removed from it.

REFERENCE

[1] Green, J. B. M., and Penfold, J. B., *Lancet*, 1947, **2**, 89.

Corrections.—Dr. R. B. COLES (Northampton) writes: May I correct a small misunderstanding in your report on my occasional paper on warts (August 2, p. 311)? I have not yet organized 100 wart watchers. We have 12 colleagues reporting on warts at the moment, but we are hoping that other people interested in warts will join us.

It has been brought to our attention that the medico-legal report entitled "The Forgotten Swab" (*Journal*, June 14, p. 1425) stated at line 10 of the second paragraph of p. 1426 that 17 swabs used as mopping packs in the course of the emergency operation had no tapes attached. We understand that all packs used at the Nairobi European Hospital have double tapes some 4–6 in. long firmly sewn on to one corner, and it was Spencer Wells forceps which were not attached to the swabs in question. We regret that this incorrect statement should have been made. We are also informed that an appeal against Mr. Justice Miles's decision has been filed for hearing in November, 1958.

Collected Articles from the "British Medical Journal"

The following books are available through booksellers or from the Publishing Manager, B.M.A. House. Prices, which include postage, are now the same for both inland and overseas.

Emergencies in General Practice (26s. 9d.).

Refresher Course for General Practitioners, Volumes 2 and 3 (26s. 9d.).

Clinical Pathology in General Practice (22s. 3d.).

Any Questions?, Volumes 2 and 3 (8s. 3d. each).

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